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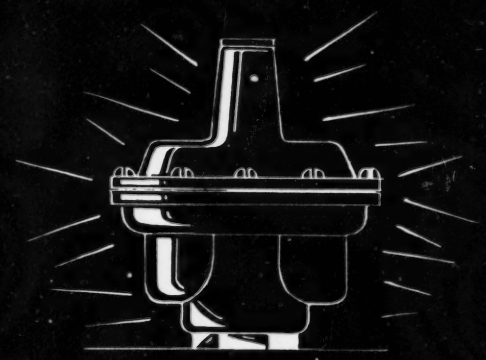

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Contents

JANUARY 1952 • VOLUME XXVIII • NUMBER 1

Re-viewing 1951 29
By George F. Mitchell

1951 Sales Top 1946-49 Average; Prospects for 1952 Brighten 34
By Louis Ruthenburg

Butane-Propane Sales Gain 26%; Use in Gas Making Holds Steady 36
By K. W. Rugh and G. R. Benz

Agenda — Four AGA Sections, PAR Committee, Ready Ambitious Program for 1952 38

Experiments in Cathodic Protection for Large Storage Tank Bottoms 44
By Louis A Snyder

Radiant Heating: Part I 46
By Oscar Shefler

Should We Integrate Pipelines With Manufactured Gas Plants? 49

Gas Keeps in Step With Demands of Modern Products and Processes 53
By Jack Huebler

• PIPELINE SECTION

1951 Certifications Point to Full Construction Year in 1952 85

FPC 1951 Certificates Topped $500 Million 86

Corrosion in Gas Engines and Compressors 95
By A. K. Hegeman

Drip Collection Through a Low-Pressure System 99

Valve Turning at Joliet Marks Completion of Third Major Line to Serve Chicago 100

Jeep Becomes Mobile Welding Shop 102

Easternmost Major Natural Gas Source Producing Gas for Pittsburgh Area 104

• COMMENT

Highlights ..... 21 **Thermally Thinking** 23

Technical Trends, by Guy Corfield 27

• DEPARTMENTS

News ..... 60 **New Products** 80
Calendar ..... 71 **Pipeline News** 100
Associations ..... 73 **Progress Reports** 107
People ..... 77 **Pipeline People** 108

Advertisers Index 112

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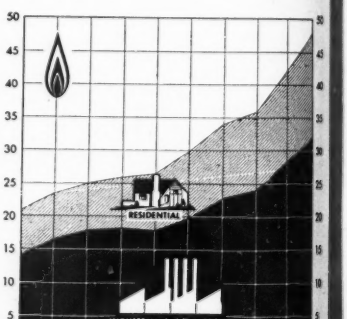
IN THIS ISSUE



TREND OF UTILITY GAS SALES (1951 DATA ESTIMATED)

SALES OF GAS (in billions of therms) soared to a new high of 48 billion in 1951, another record-smashing year. This issue is dedicated to a review of the past and a look at 1952.

Thermally Thinking

the editors

Good News and Bad

Washington

IF YOU'VE LIVED through 1951 then it's a good bet that you know how 1952 will be, barring a general war, from the Washington standpoint.

A noted politician has said that 1951 will be remembered, in Washington, as a year of minks, pinks, and stinks. No doubt many Americans will remember '51 for these things, but the more thoughtful executives of the natural gas industry, reviewing 1951, will have many more recollections about the nation's capital.

Uncertainty hung like a fog over Washington as 1951 began and the 82nd Congress took over. The same fog—thicker if possible—was apparent to everyone who understood the town as 1952 began.

The year 1951 has been surprising in its economic developments, both pleasantly and unpleasantly. It saw the natural gas industry's governmental relations reach a new peak in mutual amity and cordiality. It will be recalled that as the New Year began a year ago, the gas industry was none too happy about the prospects of being considered a stepchild of the oil industry by the Petroleum Administration for Defense. Demands were made for a special gas industry council, etc. Yet, as the year wore on, and as C. Pratt Rather, president of Southern Natural Gas Co. and assistant deputy administrator for gas of the PAD, began to represent the industry in the highest councils, it became apparent that there would be equity and fair dealing in the various moves to be made.

From a legislative standpoint, the natural gas industry fared very well in a Congress that was beset by many pressures. For one thing, despite tremendous pressure from the executive branch, Congress refused to raise excise taxes on appliances. Also, the Congress refused to go along on proposals to decrease the depletion allowances permitted to those who drill the gas in the first place. Furthermore, the House of Representatives took positive action to make clear the rights of the states to the oil and gas lying on the shelflands off the coasts of many states.

This legislation, however, was stymied in the Senate Committee on Interior Affairs and did not come to a vote in the most exclusive men's club on earth. On the other hand, the so-called Heselton bill, which would allow FPC to impose nationwide safety standards for the laying and operation of pipeline, was pigeon-holed in the House Committee on Interstate Commerce.

The Congress did a fine job of preventing the excess profits tax from being raised too much, and also in maintaining the exemptions for utilities.

From the standpoint of regulation, the natural gas industry maintained its generally cordial relationships with the Federal Power Commission. Developments in which the FPC played a principal part were generally favorable to the natural gas industry. The real upset of the year, of course, was the FPC's 4-to-1 decision in the Phillips case. The Office of Price Stabilization, however, almost simultaneously began to make it apparent that it had jurisdiction over natural gas rates—at the wellhead, as well as at the consumer level—and would exercise its jurisdiction.

Petroleum Administration for Defense, on which the natural gas industry relies so heavily for priorities and other assistance, built up a unique—and generally favorable—record of working with the industry. For one thing, no known cockeyed orders have been issued with respect to enforcing its PAD Order 2, which is designed to slow down the expansion of natural gas service in which a shortage to existing customers already is feared.

The battles inside PAD and Defense Production Administration have been many, long, and bitter, but nobody knows who has "won" or "lost" them. The amounts of steel for pipe that the gas industry could not obtain likely have gone for more essential purposes. Perhaps there could have been changes, without disastrous effects to the war effort, but only hindsight experts can determine these things.

While the good developments listed above undoubtedly are not *all* that reflected favorably for the natural gas industry, they do represent the more outstanding and salient developments in this classification.

The unfavorable developments, from the Washington standpoint, affecting the natural gas industry also were many and varied in 1951. In a way, many of these developments that could be said to have affected the gas industry adversely also had a more general effect.

A distinctly unfavorable development for the gas industry —and *all* private industry—was the passage by Congress of a third whopping income tax bill. A parallel development was the appropriation by Congress of some $10 billion more than it voted to raise by taxation.

These developments at once were both the result and cause of inflationary pressures.

This problem of inflation—which, in essence, is fired up and stoked by Congress itself, with members of both parties participating willingly—brought other terrific problems to the natural gas industry. Rate increases became inevitable. By late fall, there were applications on file with the Federal Power Commission for natural gas rate increases, at the wholesale level, totaling more than $100 million, for the first time in the FPC's history.

On the legislative front, aside from the deficit financing and the new tax burden levied, the coal interests were gathering their forces, in preparation for the time when they can, if that time ever comes, drive through a national fuels policy that would be most favorable to the coal industry and definitely not to the interest of the natural gas industry.

It appears evident that the "good" news from the nation's capital in 1951 outweighed the "bad" news for the natural gas industry. It seems that the industry had a more favored

spot in the hearts of politicians of both parties in both the legislative branch and the executive branch than had been true in many years.

What of the future?

On the basis of known political and industrial factors on the home front, on the basis that there will not be a general war, it is possible to indicate in a general way what kind of economic developments will come in 1952:

1. The labor situation will become more chaotic. Labor not only will cost more, but there will be more "drifting" than in many years, and in many areas it will become increasingly difficult to find men who are available. The U. S. Department of Labor has estimated that some 4.5 million workers must be found to man new defense and defense-related plants to be opened in 1952, and most of these industries will pay high hourly rates and offer plenty of overtime.

2. Steel for pipelines will not be any more plentiful than it is now until late '52, if then. By the third quarter, structural steel and copper should be easily in supply, but not to the extent that it will be available to all comers.

3. Consumption—on existing lines and on lines to be laid—will be at record highs in 1952. Personal income of the American people will go up with every passing month.

4. Taxes likely will not be changed—upward or downward—during the year. Congress will be extremely wary about making any large number of taxpayers yell "uncle" before an election, which is due next November. But Congress again will vote more funds than Uncle Sam will collect in taxes for the fiscal year beginning July 1, so that means a continuation of deficit financing, with all its subtle but evil effects.

5. The allocation and other special orders—and the resulting bureaucracy—likely will flow just as much as ever from Defense Production Administration, National Production Authority, Petroleum Administration for Defense, and many other emergency agencies. The number of federal agents policing taxes, wage controls, priorities controls, and all the other orders will increase, perhaps even double, in 1952. Businessmen in general, and natural gas company executives in particular, will be faced with more red tape and paper work than ever as the bureaucracy creaks along toward preparation for a total war everyone expects but says he hopes we can avoid.

FPC May Step Out of Local Picture

Washington

THE FEDERAL POWER COMMISSION, which seemed to many to have retreated in its famous decision in the Phillips Petroleum Co. case, which had the effect of putting into fact the Kerr bill (which had been vetoed by the President), *may* find itself, before the year is over, taking the same tack on the complex problems involved in pipelines located wholly within a state.

Under the famous East Ohio decision, the Supreme Court gave FPC jurisdiction over intrastate distribution lines used to transport gas at a high pressure from state line deliveries to points of distribution in Ohio.

Not long ago, both the FPC and Brooklyn Union Gas Co. officials agreed that the company, which wanted to construct a line of less than a mile long for natural gas transmission purposes, did not need an FPC license. Yet the commission, by a 3-to-2 vote, last September ruled that the company would have to obtain a federal license under the Natural Gas Act.

In the meantime, there is growing sentiment in Congress to annul the East Ohio decision by law. Sen. Herbert O'Connor (D.-Md.) has indicated he will move in the second session for consideration of his bill (S. 1084) which would have this effect. Most state regulatory commissions already are on record as favoring such legislation.

Now, FPC has granted a rehearing to the New York Public Service Commission on the subject of the FPC license for the intrastate construction in New York. By next fall, when Congress may have acted to annul the East Ohio decision, President Truman has vetoed the legislation, and it seems that greater federal control has won a victory (as it seemed for a while in the case of the Kerr bill), the FPC may reverse itself and give Congress what Congress obviously wants. A lot depends on the person who is appointed to the FPC chairmanship vacancy.

Scrap Availability a Priority Determinant

Washington

THE SCRAP SITUATION—on steel, aluminum and copper—is nothing short of desperate. Both Defense Mobilizer Charles E. Wilson and Defense Production Administrator Manly Fleischmann begged business and trade paper editors, in a meeting here, to urge top management in every industry to become active on solving the scrap shortage.

Several days later, Mr. Fleischmann warned an emergency joint meeting of the iron and steel scrap industry advisory committee and the iron and steel scrap consumers industry advisory committee that if joint efforts of private industry and government agencies do not bring results, Uncle Sam will be impelled to take on the job himself.

Some steel mills are taking scrap out of cars and directly to the furnaces. There was fear here of some shutdowns if scrap is not kept moving in ever-increasing quantities in the coming months.

Petroleum Administration for Defense says that in approving major projects involving purchases of controlled materials, it will seek assurances from now on that the scrap from the replaced equipment and facilities will be made available to scrap dealers.

The agency pointed out that it always has given priorities assistance on a determination of how essential a proposed project was to needed expansion of the supplies of oil and gas. The situation now, however, demands that it must also be taken into consideration what the project may be able to contribute to the collection of needed scrap.

"We are faced by some hard facts: No scrap, no steel," a statement asserted. "No steel, no oil or gas. We have to give thought and time and effort to getting every pound of available scrap into the steel mills so production can be kept high."

Pro-Kerr Chairman for FPC?

Washington

SPECULATION about a new chairman of the Federal Power Commission, to take the place of Mon Wallgren, the Truman crony who resigned recently, has it that a man most pleasing to Sen. Robert S. Kerr (D.-Okla.), prominent in the oil and gas field, will be named by the President.

Mr. Truman has been under strong and constant pressure from the self-styled "liberals" among the daily columists—notably Lowell Mellett and Thomas L. Stokes—to name someone who is most pleasing to the left-wing element in the Democratic party. But Senator Kerr, who votes for most Fair Deal objectives except those having to do with socializing the oil and gas industries, is in a powerful position to dictate the appointment. The President is obligated to Senator Kerr, who is extremely wealthy, in many ways.

Meantime, Commissioner Harrington Wimberly, of Oklahoma, a close friend and supporter of Senator Kerr, has been elected vice chairman of the Federal Power Commission to serve during the calendar year 1952. He will succeed Commissioner Thomas C. Buchanan, who has served as vice chairman since May, 1950. Buchanan is the only commissioner on the board now whose actions almost always are pleasing to the self-styled "liberals."

Mr. Wimberly has been a member of the FPC since late 1945. He previously served as vice chairman for part of 1947 and all of 1948. The President names the chairman of the FPC, but the commission itself selects one of its members to serve as vice chairman.

Technical Trends

guy corfield

A Big Year For Pipelines—And For Gas

DURING 1951 the total mileage of petroleum products pipelines, completed and under way, was approximately 20,300. Of this total, domestic was 17,100 and foreign 3200 miles. A further breakdown shows the domestic to be 11,400 for natural gas, 2900 for crude oil, 2800 for oil products; and the foreign 1050 for natural gas, 1550 for crude oil, 600 for oil products. This total was considerably greater than 1950 or 1949, which were themselves record-breakers.

The plans and proposals for 1952 are about 50% greater than the 1951 total. However, at least for natural gas, the general opinion seems to be that a marked slowdown in construction will develop because of rising costs of gas, increasing impact of government controls, higher money rates for financing, and difficulty in obtaining steel.

Synthetic Fuel

THE FEUD BETWEEN O. L. Chapman, Secretary of the Interior, and the American Petroleum Institute and individual oil company interests over the building and operation of synthetic liquid fuel plants is becoming more and more intense, and broke out into practically open warfare at the API convention in Chicago last November.

Secretary Chapman's stated position is that it is only a matter of time until the nation will have to turn to liquid fuels from coal or shale to supplement nationally produced petroleum, because of increasing consumption, possible war needs beyond the present armament race, and unsettled availability of foreign oil; and since the present information on synthetic fuel processes indicates the technical and economic feasibility of full-scale plants, it is now time for major development steps. He proposes to initiate a federal government-financed program, to the tune of $100 million, if and as soon as he can get the money.

The petroleum industry's stand is that this is unwarranted government competition, a further attempt to obtain and exercise control over the petroleum industry, which is perfectly capable of taking care of the interests of the public and the country if left to its own initiative and given reasonable allocation of materials for exploration and development of existing oil resources; that, furthermore, synthetic fuels are not now needed, nor can they now be produced economically, and that such attempt at production will be wasteful and extravagant use of materials and money and effort that can be much better expended for other purposes. The industry also holds that, when and if the need for synthetic fuels arrives, the petroleum industry will be ready and able to produce them, and that development now should remain on the pilot plant scale.

The gas industry is, of course, a very interested spectator to this battle. Major diversion of steel and other materials to the synthetic fuel program might directly and indirectly retard the development of further natural gas supplies; on the other hand, the establishment of these synthetic plants, which can make fuel gas as well as liquids, might further the mixing or substitution of synthetic gas in the natural gas transmission lines in the event that natural gas is unable to keep up with the growing demand now developing. (For a discussion of this possible eventuality, see the article by F. O. Hess, *GAS*, Nov. 1951, page 43.)

Technical Graduate Shortage

IN A RECENT ARTICLE in *Chemical Engineering* it was stated that the Engineer's Council estimates that 60,000 freshmen should be entering engineering schools in order to insure the required number of engineers four years hence. This is about double the number that would normally and will probably go into technical colleges. Furthermore, national defense, both in research and organized reserves, is absorbing a rapidly increasing number of scientific and technical graduates. It therefore appears most probable that industry's requirements for technologists will largely go unfilled, and that therefore properly qualified high school graduates should be advised if not urged to enroll in engineering courses.

The article went on to state, however, that serious thought should be given to the economic status of scientist and engineering groups from the standpoints of both salaries and taxes. These groups suffer real financial hardship in obtaining their higher education and then spending ten years or more in gaining experience at relatively low remuneration. Assuming that they then arrive at a reasonably satisfactory salary level, and can commence to set aside enough for retirement and old age, they find that taxes are taking this surplus; whereas, if they had commanded higher salaries earlier, as is possible in some other lines of endeavor, they could commence saving sooner and their total tax burden would be less.

Regardless of the merits of this latter statement, it appears that the gas industry should take active steps to obtain its reasonable share of what technical talent will be available, and to use it to the greatest advantage.

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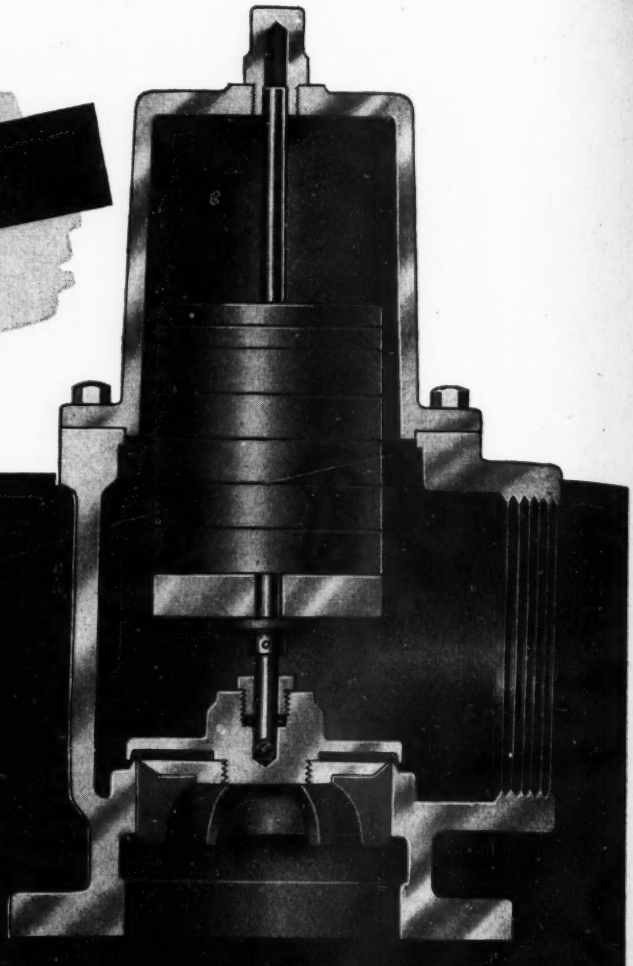

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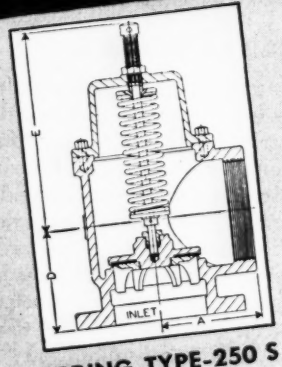

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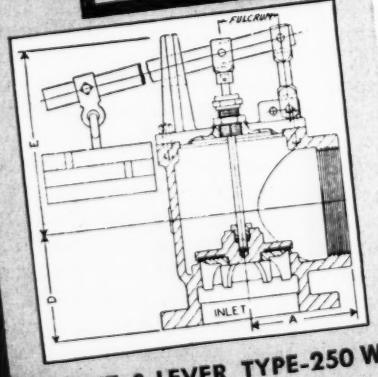

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RE-viewing 1951

By GEORGE F. MITCHELL

Customers exceeded 25 million, sales neared 48 billion therms, revenues topped $2.2 billion in another record smashing year

THE tremendous demand for gas services that has existed since the close of World War II still continues, and it lifted the gas utility to new high levels in 1951. Revenues from sales of utility gas for the first time passed the $2 billion mark. A record number of customers was added to gas utility lines and these customers were served an all-time record volume of utility gas. Nearly $1½ billion was allocated by gas utilities for new plant and equipment in 1951.

The industry continued its spectacular growth, bringing natural gas to new territories and augmenting deliveries made to areas formerly served. Conservative estimates indicate that of the $1.5 billion total, nearly $1 billion was spent in 1951 for construction of new natural gas transmission systems and expansion of the present pipeline network.

Even this huge expansion program fell short of keeping pace with consumer demand for gas. The American Gas Assn. estimates that in the five years from 1951 through 1955, nearly $4.6 billion would be spent by the gas industry for expansion. Shortages of steel and other materials have restricted the growth of the industry to some degree. Our natural gas reserves continue to gain each year. Customers remain on waiting lists in some areas. New areas are scheduled to receive natural gas. With this bright outlook ahead, it is reasonable to predict continued advances for the gas utility industry, not only for 1952 but for several years ahead.

Statistics. The gas utilities were serving approximately 25,392,000 customers at the end of 1951, including about 322,000 liquefied petroleum gas customers served directly by gas utility companies. This marks the first time gas utility customers have numbered more than 25 million. The 1951 figure represents an increase of 3.7% over the previous record figure of 24,478,000 customers on gas utility lines at the end of 1950.

Of this record number of customers served, approximately 17,167,000 were receiving natural gas, a gain of 14.2% over the 15,030,000 natural gas customers a year earlier. Manufactured and mixed gas customers totaled 7,902,000 at the year-end, a decline of 13.4%. Because the manufactured gas industry, as such, is becoming smaller each year, AGA, during the past year, adopted the practice of grouping the manufactured and mixed gas companies in a single category.

Residential gas customers numbered 23,412,000 at the end of the year, an increase of about 3.7% over a year earlier. In addition to these customers of the gas utility companies, it is estimated that nearly 6,500,000 customers are served with liquefied petroleum gas in areas not served by gas utilities. This means that more than 30 million homes are served with utility gas or bottled gas. Total sales of gas amounted to 47,869,000,000 therms, an increase of 13.7% over 42,090,100,000 therms sold in 1950. Natural gas sales totaled 44,421,000,000 therms, up 15.4% from a year previous. Manufactured and mixed gas sales were down 4.0% to total 3,359,000,000 therms.

Revenues from the sale of gas reached a new record level of $2,205,370,000, a gain of 13.2% over the previous high of $1,948,002,000, established in 1950. Natural gas revenues continued their spectacular gains, rising to a total of $1,649,050,000, an increase of 21.2% over the previous year. Again reflecting the impact of changeovers, manufactured and mixed gas revenues were down 5.4% to aggregate $535,210,000 in 1951. The balance of gas industry total revenues resulted from sales of LPG.

Gas Appliances. Sales of gas ranges in 1951 totaled about 2,400,000 units, compared with an all-time high of 3,023,000 units sold in 1950. About 1,930,000 of these ranges were installed on city gas mains, with the balance going to the LPG market. Automatic gas water heaters sold in 1951 aggregated 2 million units, against a record total of 2,363,000 units sold in 1950. About 1,740,000 of these gas water heaters were placed on gas utility lines.

Central heating units sold in 1951 amounted to 610,000 units, compared with the all-time record of 1,019,000 units sold in 1950. Gas refrigerators, like the electric refrigerators, suffered a downward trend in sales last year, although sales of some models exceeded

the expectations of the manufacturer.

There has been a tremendous increase in the demand for industrial gas equipment. Markets are still almost unlimited for gas incinerators, and gas laundry dryers. Gas all-year air conditioning sales also showed a substantial increase in 1951.

New Construction. The gas industry spent more than $1.5 billion during 1951 for construction of new facilities and expansion of present plant and equipment. This program, following expenditures of more than $1 billion in 1950, is evidence of the effort the gas industry is making to meet the still increasing demand for gas. Nearly $1 billion was spent last year on natural gas gathering, transmission and distribution lines and storage facilities.

A recent survey made by AGA revealed that for the five-year period from 1951 through 1955, the gas industry had allocated $4.6 billion for new construction and plant expansion. It was estimated that $1.5 billion of this total would be spent in 1951, and $1.3 billion was scheduled for the 1953 expansion program of gas utilities. Washington bulletins indicate there may be some shortages in steel pipe and other materials allocated to the gas industry in 1952, which may necessitate some curtailment of the industry's expansion program.

Natural Gas Growth. The rapid extension of natural gas lines and the consequent expansion of natural gas service in both new and old areas continues unabated. With natural gas in New England as an accomplished fact, there are now 39 states receiving this premium fuel, and the Pacific Northwest is the only heavily populated area in the United States not receiving this fuel.

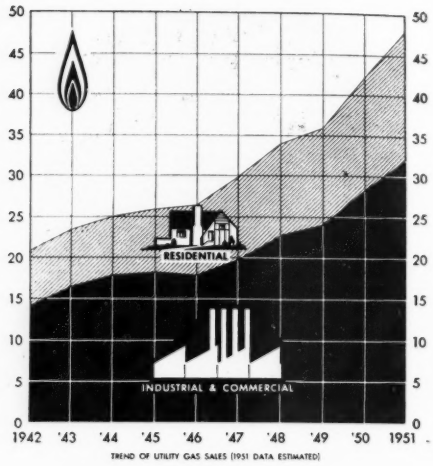
The vast expenditures for natural gas transmission facilities must be based on ample reserves of natural gas to draw upon. The natural gas reserves committee of AGA at the beginning of 1951 estimated that proved recoverable reserves of natural gas in the United States totaled 185.6 trillion cu ft, an increase of more than 5 trillion cu ft over the previous year, despite record production of 6.9 trillion cu ft during 1950. Over a long period of years, the proved reserves of natural gas have continued to gain each year.

Natural Gas Department. The Natural Gas Department's technical and research committee, acting under the PAR plan, has supervised seven projects on natural gas production and transmission problems which have advanced during the year. Valuable data have been developed for the industry. A technical committee, working with the American Petroleum Institute, has completed a comprehensive specification for field welding practices. A similar specification for railroad and highway pipeline crossings is being developed.

An important step was taken by the Natural Gas Department during the year in the organization of a committee to study the engineering and economic factors affecting underground storage of gas.

More than 350 billion cu ft of natural gas are stored underground at the close of the off-peak gas industry season. It is estimated that the industry will spend more than $100 million in the next three years on underground storage facilities.

MEASURING THE GROWTH OF GAS IN 1951



In Billions of Therms

SALES

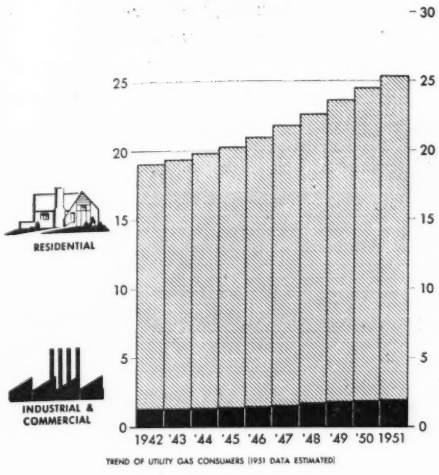
ALL GASES

Sales[1]	1951	1950	Per Cent Change
Residential	15,885,000	13,839,100	+14.8
Commercial	4,478,000	4,103,800	+ 9.1
Industrial	25,989,000	22,886,700	+13.6
Other	1,517,000	1,260,500	+20.3
Total	47,869,000	42,090,100	+13.7
NATURAL GAS			
Residential	13,721,000	11,561,600	+18.7
Commercial	3,912,000	3,496,600	+11.9
Industrial	25,322,000	22,234,900	+13.9
Other	1,466,000	1,206,800	+21.5
Total	44,421,000	38,499,900	+15.4
MANUFACTURED GAS			
Residential	1,107,000	1,454,300	−23.9
Commercial	302,000	378,900	−20.3
Industrial	272,000	337,300	−19.4
Other	46,000	46,200	− 0.4
Total	1,727,000	2,216,700	−22.1
MIXED GAS			
Residential	999,000	764,700	+30.6
Commercial	236,000	200,600	+17.6
Industrial	393,000	311,200	+26.3
Other	4,000	7,100	−43.7
Total	1,632,000	1,283,600	+27.1

[1]In thousands of therms.

Manufactured Gas Department. Some very important changes have taken place in many manufactured gas localities. Distributing companies have made tremendous strides toward applying results of research and engineering studies to provide interchangable gases during cold periods. Further research advances in production of manufactured gases with available raw materials and further advances in equipment will help to stabilize the year-round supply of gas to consumers.

AGA Laboratories. Dedication of a two-story addition to the 26-year-old Cleveland Laboratories highlighted ac-



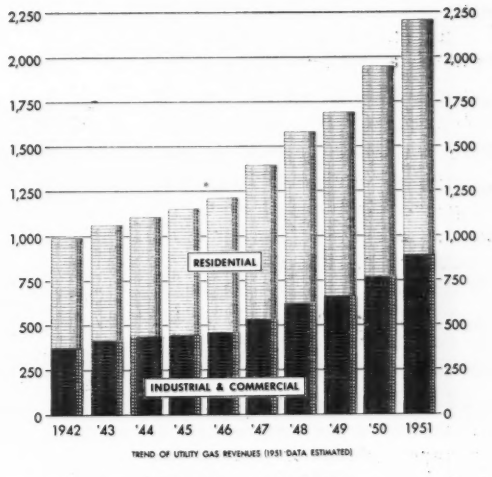
In Millions

CONSUMERS

ALL GASES

Customers[1]	1951	1950	Per Cent Change
Residential	23,412,000	22,579,000	+ 3.7
Commercial	1,852,000	1,781,000	+ 4.0
Industrial	105,000	102,000	+ 2.9
Other	23,000	16,000	+43.8
Total	25,392,000	24,478,000	+ 3.7
NATURAL GAS			
Residential	15,760,000	13,783,000	+14.3
Commercial	1,324,000	1,180,000	+12.2
Industrial	64,000	56,000	+14.3
Other	19,000	11,000	+72.7
Total	17,167,000	15,030,000	+14.2
MANUFACTURED GAS			
Residential	4,364,000	6,687,000	−34.7
Commercial	316,000	475,000	−33.5
Industrial	21,000	31,000	−32.3
Other	4,000	4,000	.....
Total	4,705,000	7,197,000	−34.6
MIXED GAS			
Residential	2,993,000	1,809,000	+65.5
Commercial	185,000	99,000	+86.9
Industrial	19,000	14,000	+35.7
Other	[2]	1,000	.....
Total	3,197,000	1,923,000	+66.3

[1]As of Dec. 31 (1951 estimated). [2]Less than 500 customers.



In Millions of Dollars

REVENUES

ALL GASES

Revenues	1951	1950	Per Cent Change
Residential	$1,318,600,000	$1,177,070,000	+12.0
Commercial	288,050,000	265,571,000	+ 8.5
Industrial	565,530,000	479,610,000	+17.9
Other	33,190,000	25,751,000	+28.9
Total	$2,205,370,000	$1,948,002,000	+13.2
NATURAL GAS			
Residential	$ 915,520,000	$ 748,762,000	+22.3
Commercial	200,440,000	170,837,000	+17.3
Industrial	504,200,000	420,203,000	+20.0
Other	28,890,000	21,203,000	+36.3
Total	$1,649,050,000	$1,361,005,000	+21.2
MANUFACTURED GAS			
Residential	$ 259,470,000	$ 332,492,000	−22.0
Commercial	60,390,000	74,637,000	−19.1
Industrial	37,650,000	43,242,000	−12.9
Other	3,820,000	4,065,000	− 6.0
Total	$ 361,330,000	$ 454,436,000	−20.5
MIXED GAS			
Residential	$ 128,350,000	$ 80,441,000	+59.6
Commercial	22,050,000	14,802,000	+49.0
Industrial	23,090,000	15,573,000	+48.3
Other	390,000	398,000	− 2.0
Total	$ 173,880,000	$ 111,214,000	+56.3

tivities for 1951.

The new building represents the third major expansion of the laboratories in Cleveland since their founding in 1925. Together, the Cleveland and Los Angeles laboratories now provide testing and research facilities totaling 70,800 sq ft with a total investment in plant of approximately $866,000.

Appliance testing and inspection operations for the year represented about three-quarters of all laboratories activities on a revenue basis. Testing alone accounted for approximately one-half of all operations. Although testing activity declined somewhat from the 1950 peak, about 3500 individual appliances and accessories were tested during the year. Central heating equipment represented nearly 60% of total testing activities.

Inspection of approved appliances in the field at manufacturers' plants increased, and a total of more than 1000 annual and unannounced inspections were made. Important revisions in the approval standards made last year included clarification of construction requirements and adoption of new performance requirements for electrical components and the wiring of appliances requiring them. New requirements texts embodying extensive revisions to those for central heating appliances, unit heaters, automatic pilots, and water heaters were adopted.

Seven research publications were issued covering domestic and industrial studies and a number of projects were continued or initiated.

Residential Gas Section. The Residential Gas Section cooperated with the promotional and advertising committees in implementing campaigns during 1951 covering all domestic gas appliances. The dealer relations committee was reactivated to effect better liaison and closer integration between the gas industry and the dealer. A survey made to determine the type of program and

materials needed by gas companies at the local level will serve as a base for this committee's activities during 1952.

The section's committee on housing distributed much pertinent information.

The committee on improving domestic gas appliances continued its studies of gas range requirements to the end of upgrading gas ranges. They drafted a set of recommendations designed to improve efficiencies and operation of CP gas ranges. These recommendations have been presented to the range division of GAMA for action.

Industrial and Commercial Section. Industrial gas sales increased in step with the progress made throughout the nation in defense production. Industrial gas sales revenues increased nearly 18% during 1951, compared with a total increase of 13.7% for the whole industry and an 8.5% gain for commercial gas sales.

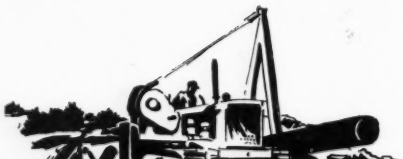
Information letters on utilization and sales were produced during the year and a new commercial sales bulletin, "Flame Facts," was initiated. This monthly bulletin will be mailed to food service equipment dealers for distribution to salesmen, architects, and designers.

With equipment improvement as an objective, good progress has been made by committees of the section in encouraging manufacturers of commercial equipment to submit equipment for AGA approval. Specific recommendations also were made to the approval requirements committee on deep fat fryer construction and the use of automatic pilots in ovens.

Accounting Section. Many important contributions to the industry were made by committees of the accounting section during the year. Among these were the work of the taxation accounting committee which culminated in obtaining fair treatment for utilities under the new excess profits tax law; the development of a plan for the protection of records under emergency conditions; the completion of the format for the program of training by manual and films; and forward steps in the advancement of a standard packaging project sponsored by the materials and supplies committee.

Operating Section. New committees were set up to study piping on customers' premises and to review proposed standard rules for gas service prepared by the National Assn. of Railroad & Utility Commissioners. Another committee is working to prepare a new edition of the *Gas Engineers Handbook.*

Accident Prevention. For the past three years there has been a steady decline in the frequency with which injuries have occurred and the average



amount of time lost by the workers involved. Fatalities were 35% less in 1950 than in the preceding year. The total number of disabling injuries was 11% less in 1950 than in 1949 and the same decrease was experienced in the amount of time lost for each accident.

PAR Plan. The gas industry successfully completed its seventh year of operation of the coordinated Promotion, Advertising, and Research plan, to which gas utility companies have subscribed nearly $12 million.

Sales campaigns spearheaded by the AGA promotion bureau were successful in helping to offset buying slumps that followed the panic buying in the post-Korea months. Through the splendid integration of the advertising and promotion efforts of gas utilities, gas appliance manufacturers, dealers, GAMA, and AGA, our industry was again able to match, and in some instances exceed, the efforts of competitors.

During the year the association sponsored an important research project to insure housewives a "cold" range that will use no fuel when not in use.

National Advertising. Some 240 million messages illustrating the latest developments in domestic, industrial and commercial gas appliances and equipment appeared in 35 national consumer magazines and business papers during the AGA national advertising campaign for 1951. Financed by the PAR plan, this program consisted of 341 advertisements at a cost of $825,000.

Major advertising effort in the residential field was concentrated on gas cooking and the gas range, coordinated with the AGA's special promotional campaigns. In addition, well rounded advertising campaigns were conducted in behalf of the automatic gas water heater and clothes dryer, and the gas refrigerator. These were also timed to support national sales drives on those appliances.

For the fourth consecutive year the association offered its cooperative space-sharing proposal to manufacturers of gas ranges who do national advertising. Ten manufacturers participated. For the first ninth months of the year, this proposal was successful in building the volume of combined AGA and gas appliance manufacturer gas range advertising up to the point where it enjoyed a substantial lead over electric range advertising. Advertising of gas water heaters far out-distanced that of electric water heaters.

Advertising directed to the industrial and commercial fields was concentrated on 13 markets offering good opportunities for growth and at favorable rates. Some 8 million messages appeared during the year.

Promotion. The threat of war with its attendant complications hampered the Promotion Bureau in coordinating its activities to the fullest extent with those of the manufacturers and utilities.

National promotions were launched to promote gas incineration, automatic gas water heaters, gas clothes dryers, and gas ranges in the spring. The Spring Style Show had a tie-in with the MGM picture, "Father's Little Dividend," with Elizabeth Taylor as queen of the style show. This proved very effective. Campaigns also were prepared for househeating and air conditioning, although these were intended for limited markets. A refrigeration campaign for the summer months was coordinated with Servel's silver anniversary drive.

Another movie tie-in was made, this time with the MGM picture, "Texas Carnival," starring Esther Williams, as an important feature of the Old Stove Roundup.

New Freedom Gas Kitchen. To stimulate sales of gas clothes dryers, the work of the New Freedom Gas Kitchen bureau has been expanded to include laundries and, when gas house heating is generally available, the program will be expanded to include the New Freedom Gas Home. As a result of the program, many news articles have appeared in women's magazines. These included stories on the AGA "heart-saver" kitchen, the new type built-in gas range, and articles written around kitchens prepared for the 1951 AGA convention at the Laclede Gas Co. in St. Louis.

The *McCall's* kitchen contest was supported by 112 gas utility companies covering 700 communities. These utilities and their dealers requested 1500 promotion and publicity kits.

Research. A number of noteworthy advances have been made in the research work being carried on under the PAR plan. Practical data have been developed on fundamentals of heat transfer, under the domestic utilization research program, that will be of distinct help to domestic heating furnace designers. Studies in the corrosion field will guide manufacturers in the selection of materials for the combustion side of appliances.

A definite forward step was made in industrial and commercial utilization

research in studying problems connected with gas deep fat fryers, and a model embodying the results of the study was constructed. At a seminar for manufacturers of deep fat fryers, all present expressed great interest and agreed to try out the new design features.

The research work on natural gas production and distribution has developed a humidity recording device rugged enough for pipeline application and sensitive enough to control dehydrator operation. Nineteen of these devices, entirely the result of a research project, are now in service or on order. Results of the first series of tests on orifice meter installation requirements have been published in bulletin form.

The industry is finding increased application of the Hall high-Btu oil gas sets for the production of oil gas where high-Btu gas is distributed, or for supplementing natural gas supplies. Some 22 sets are now in operation or on order. This process was developed under the AGA gas production research program and it has been estimated that the annual savings through the use of heavy oil in these sets will more than offset the average yearly cost of gas production research.

The first step in the production of a substitute natural gas is well along under a "coal gasification" project being carried on at the Institute of Gas Technology. A pilot plant has been finished and undergone shakedown tests. Trial runs have produced encouraging results.

The AGA research program, sponsored under PAR, amounted to about $650,000 for 1951. In this program some 47 projects of major interest to the gas industry were conducted. Some 26 bulletins and reports have been distributed in the past year.

Utilization. The utilization bureau has maintained contact and performed valuable work with several federal bureaus and agencies in the past year. Among these were the Public Housing Administration, Veterans Administration, and the Federal Housing Administration. Assistance also was given to several utilities serving military bases of all kinds.

Results of studies on comparative uses of gas and electricity and meat shrinkage were published and proved very beneficial to the gas industry. Work done with the American Automobile Assn. resulted in the restriction of use of the AAA symbol to hotels, motels, cabins, etc., using gas heat only where approved fully vented gas heaters are used. The bureau also cooperated in the automatic range ignition field testing program. Considerable work also has been done on building codes and other ordinances, helping more than 25 local gas companies with problems of this nature.

The bureau also has been able to assist gas utilities in obtaining a fair basis for evaluation of merits and costs of gas service in several localities where highly competitive situations existed.

Statistical Bureau. The bureau of statistics again prepared and issued an edition of *Gas Facts*, the statistical yearbook of the industry. The 1950 edition included for the first time the composite financial statements for the entire gas industry and key statistics for Canadian gas utilities.

The bureau participated in a regional conference with the New England Gas Assn. which was devoted to some of the economic aspects involved in conversion to natural gas. It also took active part in a conference on the economics of gas househeating held in Chicago in November. A long range project to analyze the many aspects relating to the economics of gas househeating has been initiated and the bureau will do much of the detail work under this project.

The director of the bureau has been appointed one of the consultants to the gas division of the Petroleum Administration for Defense. Through this means the bureau will be able to render further assistance to the Gas Division of PAD. The bureau also made a special study on consumer acceptance of major gas appliances in newly constructed dwelling units that proved most favorable for the industry.

Washington Office. With the enactment of the Defense Act of 1950, the Executive Board authorized the reestablishment of a Washington office as a source of information and advice on matters pertaining to defense and the regular agencies of government.

Personnel and Rate Committees. The AGA personnel committee made a thorough study of the manpower situation last year and has prepared data that could be used in securing relief and in determining essential activities within the gas industry.

The AGA rate committee completed a study of trends in rate changes during 1950 that indicates more rate reductions were put into effect during the year than rate increases.

Public Information Bureau. During the past year the publicity bureau and the publications bureau were combined to form a bureau of public information which functions in both fields. Much favorable publicity was obtained in women's and national business magazines as well as in newspapers and the trade press.

Financial bulletins highlighting gas industry progress, in addition to regular statistical information, were furnished to more than 600 financial institutions, stock exchange firms, banks, and other interested organizations. The bureau furnished material and stories for articles in important publications such as *Business Week, Scientific American, National Geographic Magazine, Collier's Year Book, Reader's Digest,* and others.

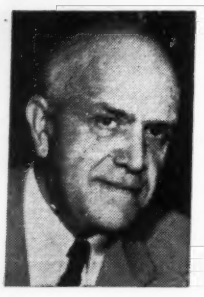
Special stories were syndicated by wire services, and many leading newspapers regularly use charts and pictures pertaining to gas industry facts furnished by the bureau. Convention publicity this year was gratifying.

The *AGA Monthly* was again awarded the highest citation of the International Council of Editors for outstanding editorial content and appearance. The AGA annual report merited much favorable comment and the bureau was able to give assistance to sections and other bureaus in the production of printed material.

Conclusion. The gas industry had to overcome many obstacles to achieve the splendid record it made in 1951. All of the elements are present for a continuation of the industry's advances in 1952. Consumer demand still exceeds the ability of gas utilities to serve such needs in some areas; the industry has allocated more than $1¼ billion for an expansion program for next year; the defense production curve is rising, creating further demand for industrial utilization of gas; and some 800,000 new homes are predicted for next year.

Balanced against these factors are the uncertainties that underlie the national economic picture. Defense production requirements already have curtailed supplies of steel pipe and other materials needed for the industry's construction and expansion program. Rising costs will necessitate upward adjustments of rates in some areas. The imposition of further federal and state controls and taxes may curtail exploration for new fields and retard the increase of natural gas reserves.

Despite these matters which are mostly beyond control of the gas industry, the outlook for 1952 appears most favorable.



GAMA LEADER LOUIS RUTHENBURG, *looking back on 1951, finds it was actually a very good year in the production and sales of equipment and appliances.*

1951 Sales Top 1946-9 Average; Prospects for 1952 Brighten

RE-viewing 1951

HOW was 1951 among gas appliance manufacturers?

We know that sales of domestic gas appliances dropped sharply. But the number of residential gas customers increased by more than a million and a quarter to an all-time high of 29,662,000. The market is expanding, and that's a good sign.

Automatic water heater manufacturers naturally can't rejoice over the drop in sales from 1950's 2,363,000 to 1951's 2 million. But if the abnormal peak year is thrown out, the scene changes, and we find that 1951 sales were five times the 1936-40 pre-war average of 425,800, 2½ times the 1941 pre-war high of 800,000, 31% over the 1946-9 average. Is that bad?

Househeating Hit Hard

While domestic gas ranges dropped from 1950's 3,023,000 to 2,400,000, nearly a million more ranges were sold than were being sold annually from 1936 to 1940. Sales were 6% over the 1946-9 average. Was it a bad year? I don't think so.

Gas househeating was really hit hard, compared with 1950: more than a million were sold in 1950, only 610,000 in 1951. That's a 40% drop, and it hurt plenty. Yet 1951 sales were nearly eight times the 1936-40 volume, nearly three times the pre-war peak of 206,500, which was sensational in 1941, and 30% over the 1946-9 average. That looks like progress, doesn't it?

The big question for 1952 is what to do to make the most of our opportunities under today's conditions. There are problems aplenty. But on the whole, prospects seem considerably brighter than they did a few months ago. Recent surveys indicate that many householders are planning purchases of major appliances during the first half of the year. People are buying again and there's been a stepup in installment buying. Selling won't be a pushover, but the business is there if the dealer goes out after it.

Adequate Allocations

The seriousness of the materials situation should not be minimized, but thinking in terms of actual needs for new installations and modernization, it seems likely that allocations will be somewhere near adequacy. By determinedly making the most of what's available, gas manufacturers should be able to fill orders within a reasonable period, at least through the first half of 1952. I think it's safe to say we can expect fair allocations from government agencies. GAMA has provided them with authoritative facts and figures to aid in evaluating the essentiality of gas installations. They recognize the importance of gas and gas burning equipment to the national economy and to defense.

The defense regulations committees of the various GAMA divisions are working closely with government so that they may recommend to members voluntary steps in conserving critical materials which may ease the situation and help to make more drastic and compulsive action unnecessary.

This Year's Outlook

Let's focus on the outlook for each GAMA division in 1952:

Househeating: Supply restrictions will lead manufacturers to aim strong selling efforts at areas where no restrictions exist, and where none are likely to be imposed. With construction due to drop considerably, manufacturers will shoot for a higher percentage of installations. They will simplify products without impairment of efficiency to fill orders and to improve their competitive position.

Water heaters: Critical copper, monel metal, and steel will not be available to meet demand. Construction and performance standards will remain unchanged. The recent trend to larger sizes may encourage manufacturers to concentrate on such sizes.

Ranges: Prospects are that production will be adequate. Promotion budgets indicate the belief that production and opportunity will be sufficient to justify extra effort.

Refrigerators: Highly selective demand in 1951 centered on large capacity, deluxe models. Plans have been made to cater to this consumer preference.

Incinerators: Free of excise taxes, and with a vast untapped market, this division has a big selling opportunity and probably enough materials to meet created demand.

Dryers: It's doubtful that manufacturers will be able to keep pace with demand in this rapidly growing market, but there's a missionary job to be done

to cultivate its tremendous potential.

Commercial equipment: With the removal of the excise tax, increased demand in new and existing installations is seen. Military demand may cause delays.

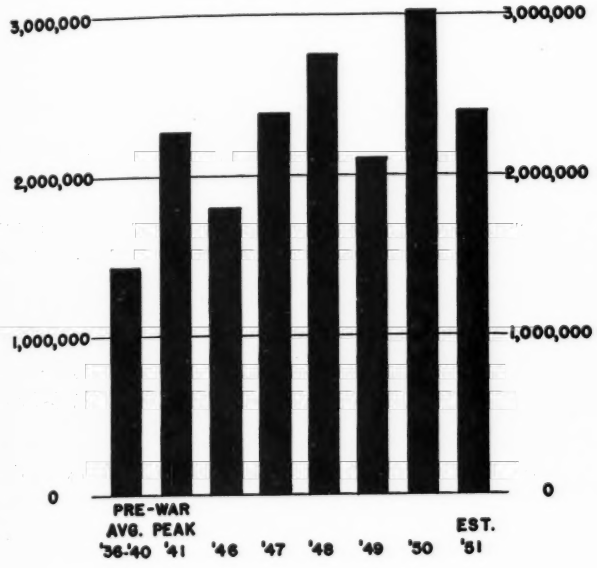
Industrial equipment: Manufacturers will have a problem in producing the vast quantities needed to handle the stepup in industrial production.

Meters, valves, controls: Expectations are that deliveries will occur pretty much on schedule.

That's it. The industry faces a year of problems, perhaps a hand-to-mouth operation in spots, but it's no time to sit back and let the competition gain an advantage. The gas industry was guilty of a lack of promotional effort during World War II and suffered for it. But we won't let it happen again.

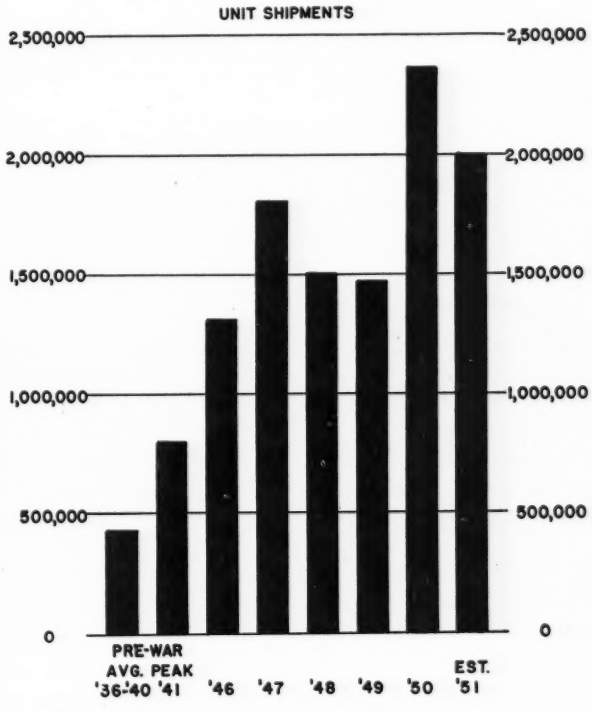
DOMESTIC GAS RANGES

UNIT SHIPMENTS



AUTOMATIC GAS WATER HEATERS

UNIT SHIPMENTS



PRELIMINARY ESTIMATES

1951 UNIT SHIPMENTS OF GAS APPLIANCES AND EQUIPMENT COMPARED TO 1950

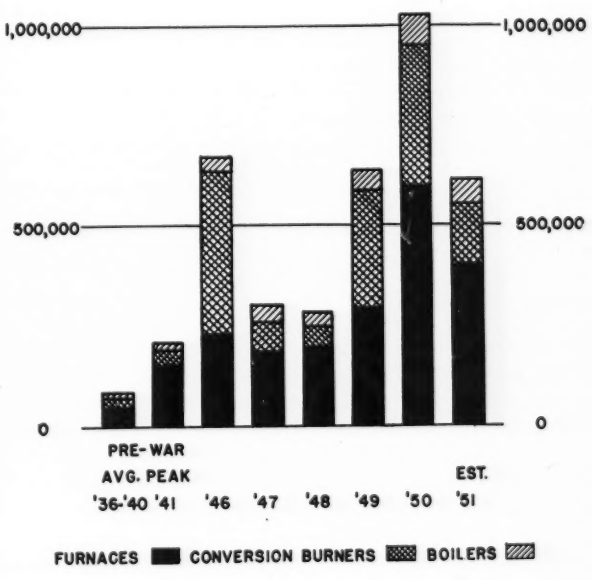
	1951 (Est.)	1950	Per Cent Change
Domestic Gas Ranges			
City Gases	1,930,000	2,388,200	-19.2
L.P. Gases	470,000	634,800	-26.0
Total	2,400,000	3,023,000	-20.6
Automatic Water Heaters			
City Gases	1,740,000	2,053,100	-15.3
L.P. Gases	260,000	309,900	-16.1
Total	2,000,000	2,363,000	-15.4
Central Heating Equipment			
Warm Air Furnaces	400,000	597,700	-33.1
Boilers	60,000	76,500	-21.6
Conversion Burners	150,000	345,300	-56.6
Total	610,000	1,019,500	-40.2
Floor & Wall Furnaces	475,000*	595,000	-20.2
Direct Heating	2,000,000*	—	—

* Estimated 19% L.P. gas

GAS-FIRED HOUSE HEATING EQUIPMENT

(WARM AIR FURNACES, CONVERSION BURNERS, BOILERS)

UNIT SHIPMENTS



K. W. RUGH and G. R. BENZ *of Phillips Petroleum Co., in their annual report on L.P. gas sales, note a gallonage increase equal to 1944's total sales, conclude that demand is "insatiable."*

Butane-Propane Sales Gain 26%; Use in Gas Making Holds Steady

RE-viewing 1951

THE steady but rapid growth and expansion of the liquefied petroleum gas industry continues unabated as it has since its progress was first summarized in early 1929. Sales of L.P. gas in 1951 reached an estimated 4,100,000,000 gallons, exclusive of any product used in the manufacture of aviation and meter gasoline or synthetic rubber. This is an increase of 25.9% over 1950. The gallonage increase of 846,000 gals. is almost equal to the total sales of 1944.

The demand seems insatiable. Shortages in winter are apt to be felt again, especially if colder-than normal weather occurs. Secretary Chapman urged "summer storage fillup" and the industry entered this winter with its storage in better shape than a year ago. The storage and transportation picture appears brighter for 1952.

Change In Reporting Method

With this report, the writers are making a change in the method of reporting L.P. gas sold for fueling internal combustion engines. This change brings under one heading, "Domestic and Meter Fuel," all L.P. gas sold directly by producers and marketers as direct meter fuel plus all L.P. gas sold by *distributors*.

Prior to 1951, L.P. gas sold direct by producers and marketers to consumers using it *solely* for fueling internal combustion engines was reported under the "Industrial and Miscellaneous" heading. L.P. gas sold by domestic distributors but ultimately used as internal engine combustion fuel was reported under the "Domestic" heading.

Domestic and Motor Fuel Use

Sales of L.P. gas for domestic and motor fuel purposes are estimated at 2,868,000,000 gals. in 1951. This represents an increase of 32.5% over 1951 sales in this category, and far exceeds the total sales of the entire industry in 1949.

During 1951, an estimated 470,000 ranges were produced specifically for use with L.P. gas. An additional large volume of ranges, produced for other gases, were adaptable with only minor changes to L.P. gas, and undoubtedly many were connected to L.P. gas installations. Approximately 260,000 of the automatic gas water heaters manufactured in 1951 were for L.P. gas. The trend toward bulk distribution of L.P. gas continued to gain momentum during the year. Since the major load in bulk distribution is for househeating, it is significant to note that an estimated 19% of the gas-fired floor and wall furnaces produced in 1951 were made for L.P. gas. Appliance sales during 1951 would not, of course, reflect the buying boom of July and August of 1950 caused by the outbreak of hostilities in Korea.

At the close of 1951, it is estimated that there were in excess of 8 million L.P. gas installations on farms and in suburban areas. This figure takes into account the L.P. gas installations serving summer homes, trailers, motels and other commercial establishments as well as the growing number of multiple installations on farms. As may be expected, it far exceeds any figures based on single installations at "permanent" residences, which obviously do not include the categories listed above. There now exist an estimated 4500 L.P. gas bulk plants throughout the country.

The national committee for L.P. gas promotion, an industry-sponsored organization founded in 1950 to advertise and promote L.P. gas at the retail level, completed its first full year of operation in 1951. Membership in this organization grew rapidly during the year, with some 850 participating companies enrolled at year end. As part of its activity the national committee sponsored an intensive study of the industry's unbalanced supply condition brought about by its low-summer-versus-high-winter sales demand which is the result of the increased use of L.P. gas for househeating. A well integrated program to combat this problem by promoting adequate storage at the consumer level was developed and initially presented to the industry late in 1951.

Conversion Sales High

Sales of L.P. gas conversion equipment for farm tractors continued at a high level in 1951. Factory-engineered L.P. gas farm tractor models were announced by two additional tractor manufacturers during the year. As previously noted the L.P. gas load for irrigation pumping reached notable new highs in 1951. Use of the product by trucks, buses and taxi fleets also showed large gains during the year. Well over 1000 city and inter-city buses using L.P. gas have been put in oper-

MARKETED PRODUCTION OF L.P. GAS

Year	Total Sales Gallons (Thousands)	Per Cent Increase	Distribution - 1000 Gal. Domestic & Motor Fuel(1)	Per Cent Increase	Ind. & Misc.(2)	Per Cent Increase	Gas Mfg.	Per Cent Increase	Chemical Mfg.	Per Cent Increase
1941	462,852	47.7	220,722	64.7	172,669	38.6	25,255	24.5	44,206	27.5
1942	585,440	26.5	303,857	37.6	197,179	14.2	31,366	24.2	53,038	20.0
1943	675,233	15.3	344,962	13.6	237,396	20.4	37,519	19.6	55,356	4.4
1944	898,071	33.0	445,617	29.2	254,590	7.3	45,879	22.3	151,985	175.0
1945	1,067,979	19.0	533,262	19.7	256,577	0.8	53,849	17.4	224,291	47.5
1946	1,410,370	32.1	758,466	42.2	253,745	-1.1	86,660	61.0	311,499	38.8
1947	2,008,262	42.4	1,150,538	51.7	274,125	8.0	169,332	95.4	414,267	33.0
1948	2,511,160	25.0	1,473,289	28.1	275,883	0.6	237,638	40.3	524,350	26.6
1949	2,658,749	5.9	1,627,550	10.5	247,103	-10.4	239,210	0.6	544,886	3.9
1950	3,254,082	22.4	2,034,464	24.9	355,456	(3)	251,694	5.2	612,468	12.4
1951	4,100,000	25.9	2,868,000	(3)	230,000	(3)	252,000	0.0	750,000	22.5

(1) Household use plus other requirements by these customers such as irrigation pumping, tractor fuel, flame weeding, chicken brooding, and similar uses. Included also is L.P. gas sold by domestic distributors but used for industrial purposes, internal combustion engine fuel, and for gas manufacturing purposes. Included also, in 1951 only, is L.P. gas sold direct by producers and marketers solely for fueling internal combustion engines.

(2) For all years prior to 1951, includes L.P. gas sold for fueling internal combustion engines.

(3) Not comparable due to change in method of reporting L.P. gas sold for fueling internal combustion engines.

ation in the last 18 months. Several major manufacturers of heavy duty engines are contemplating the production of factory engineered and produced L.P. gas burning engines. For many such manufacturers, work on this project is well beyond the research and development stage and road testing is in full swing.

Industrial Use

L.P. gas sales for industrial and miscellaneous purposes totalled an estimated 230 million gals. at year end, an increase of 2% over 1950. The last quarter of 1950 brought a definite upsurge in L.P. gas sales to industry as the country's defense program swung into high gear at various manufacturing plants.

Sales of L.P. gas to utilities are estimated at 252 million gals. in 1951, the same as 1950. Extension of natural gas lines to new locations and additional supplies of natural gas to areas where it was already available continued during the year. The long-term effect of such activities is to increase the potential L.P. gas use by utilities for standby purposes. The short term effect, however, is to reduce actual L.P. gas demand, and these short term effects were felt by the L.P. gas industry during the year.

Chemical Manufacture

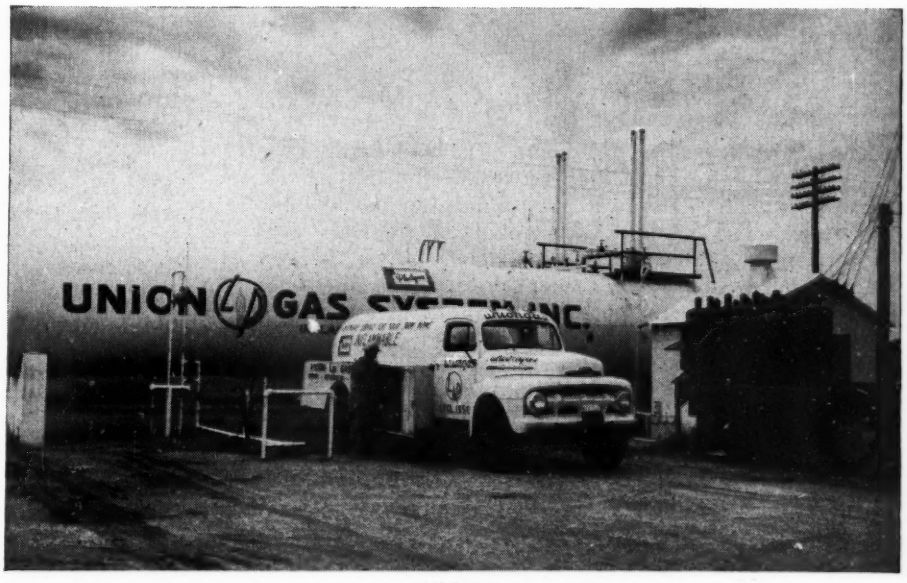
The sale of L.P. gas as a raw material for the manufacture of chemicals and of chemical intermediates again set an all-time high during 1951. Total sales for this use are estimated to be 750 million gals., an increase of 22.5% over 1950.

The present supply situation is very tight and many indications at the moment point to another winter shortage. The committee on liquefied petroleum gas availability, transportation and material requirements, appointed by the National Petroleum Council in May 1951, has reported maximum monthly production capacity up 15.7% over last year. The increased demand of 25.9% in 1951 over 1950 indicates a relatively increasing consumption of L.P. gas during the off-peak demand months.

Since it is estimated that 50% of the L.P. gas is transported by tank car, a review of the tank car situation is important. The Defense Transportation Administration census of tank cars as of Jan. 1, 1951 revealed that there were 10,302 pressure cars in liquefied petroleum gas service.

Tank Car Situation

As of Oct. 1, 1951, 1270 cars had been added to the fleet during the year making a total of 11,572 L.P. tank cars in service. It is further estimated that by the end of the year 1071 additional L.P. gas cars will be completed and placed in service. In addition to these cars a large number has been constructed for dual service (anhydrous ammonia-liquefied petroleum gas). The drastic effects of not keeping the cars rolling was clearly demonstrated during the railroad strike of last winter.

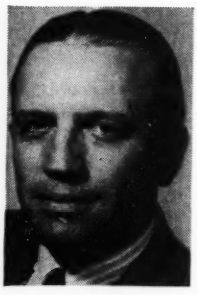


Delivery truck is filled at one of the nation's 4500 L.P. gas bulk plants. In addition, there were an estimated 8 million L.P. gas installations on farms and in suburban areas at the close of 1951.

Agenda

Four AGA Sections, PAR Committee Ready Ambitious Programs for 1952

Residential Gas Section



W. J. Schmidt

INCREASED taxes, credit restrictions, higher living costs, and competitive efforts will combine to make necessary an intensified sales and promotional program during 1952, in the opinion of W. J. Schmidt, Long Island Lighting Co., chairman of the residential gas section.

Cutbacks in steel and other critical materials through the first three quarters may reach 50% of those materials available during the same period in 1950, Mr. Schmidt believes, with appliance production approximating that of 1949, a good (though not a record) production year.

Under the section's long-range planning setup, the 13 committees which will function during 1952 have completed their programs and have had them approved by the section's managing committee and the promotional planning committee. All the campaigns are subject to constant scrutiny and review by the interested committees in the light of conditions which exist at the time they are to be put into effect.

Water Heating

The gas water heating campaign, to be held during February and March, is based on an attempt to create more sales of automatic water heating equipment by the plumber and dealer. The theme, "Ask your plumber-dealer," will be carried in national AGA advertising during the two months, and GAMA's water heater division will distribute a brochure with the same title. In addition, a guessing contest with entry blanks available only through plumbers and dealers will provide a prospect list. Display materials and advertising mats will be available to utilities and to plumber-dealers.

During the same period, GAMA will make available to utilities copies of the publication, "Our Health—Our Strength."

Clothes Dryers

"Fresh as all outdoors" is the 1952 theme for the gas clothes dryer sales program to be conducted during February-March and August-September with major emphasis on the latter period. Although gas clothes dryers are being outsold 3 or 4-to-1 by electric, despite gas' advantages, much progress has been made since the organization of the gas laundry dryer committee several years ago.

This year's materials will include a window display, a series of pennants, lapel clothespins, newspaper mats, and special premiums such as face cloths, towels, and sheet and pillow case sets. It is tentatively planned to include a 24-sheet poster also. A suggested contest based on customers' guesses as to which towels were dried outdoors and which were dried in an automatic gas clothes dryer is under consideration.

"How-to-do-it" case histories on successful laundry dryer promotions by utilities will also be made available. GAMA's dryer division is preparing a special brochure for dealer distribution which will be made available to all gas utilities as part of the AGA program.

Gas Ranges

The 1952 spring gas range promotion (April, May, and June) will again feature a motion picture: the MGM technicolor production, "Lovely to Look At," starring Red Skelton, Kathryn Grayson, and Howard Keel. Although Mr. Skelton is not available for commercial tie-ins (being all tied up with Tide), Miss Grayson and Mr. Keel will appear in the publicity and promotional portions.

The movie is a remake of the operetta "Roberta," and is scheduled for release in April in key cities. In the film a style show is held in the Parisian salon for which Adrian is designing 30 gowns. An effort is being made to release these gowns to AGA, in which case they will be packaged in groups of five or six and distributed for actual style shows sponsored by local gas utilities and department stores. Aim of the style shows is to connect glamor with automatic gas cooking.

Many tie-in materials will be available for use with the "Lovely to Look At" and "Spring Style Show" themes. Newspaper mats will feature Kathryn Grayson, as will a special lithographed display, and women's page-type publicity material will be available from GAMA.

In addition to the usual items—counter cards, jumbo range tags, pennants, window valances, etc.—two style show traffic builders will be a giveaway apron designed by Adrian and a die-cut cardboard doll with six tabbed, full-color, Adrian-designed gowns, as well as a three-dimen-

sional gas range with six tabbed range tops and fronts. This kit is designed for giveaway to girls accompanied by parents who come to see the range.

(Use of gowns designed by Adrian is subject to clearance, which was expected by presstime. If such arrangements cannot be obtained, another designer will provide the gowns.)

Complete campaign portfolios are to be mailed to all utilities and range manufacturers on Jan. 15. A month later GAMA will distribute a dealer brochure, "Another Big Gas Industry Star-Studded Promotion for You."

Househeating

This year's househeating campaign, to be conducted during April, May, and June, will follow the format of the 1951 program designed for use by utilities who are under partial or full restrictions on the sale of gas for heating. Based on upgrading obsolete equipment and controls, it will include sales and promotional ideas for use by companies not under PAD restrictions.

Special materials include the "Gas House Heating Sales Maker," which is a comprehensive sales manual for gas company and dealer salesmen, and the consumer booklet entitled "10 Predictions for Fair and Warmer When You Heat Your House With Gas."

CALENDAR

Residential Gas Section

National Housewares & Home Appliance Exhibits — Navy Pier, Chicago, Jan. 17-24.

National Assn. of Home Builders of the U.S.—Chicago, Jan. 20-24. AGA will exhibit.

AGA Home Service Workshop—Drake hotel, Chicago, Jan. 21-23.

AGA Residential Gas Section Managing Committee — Drake hotel, Chicago, Jan. 24.

AGA Residential Gas Section Committee on Housing — Drake hotel, Chicago, Jan. 25.

AGA Residential Gas Section Gas Refrigeration Committee — Drake hotel, Chicago, Jan. 28.

American Society of Heating & Ventilating Engineers—St. Louis, Jan. 28-30.

AGA Residential Gas Section Committee on Improving Domestic Gas Appliances—Drake hotel, Chicago, Jan. 29.

Eastern Natural Gas Regional Sales Conference, Residential Gas Section—Hotel William Penn, Pittsburgh, April 7-8.

Midwest Regional Gas Sales Conference —Edgewater Beach hotel, Chicago, April 21-23.

National Housewares & Home Appliance Manufacturers Exhibits — Atlantic City, July 7-13.

Summer Air Conditioning

In line with the plan followed for the past several years, the gas summer air conditioning committee will concentrate on promoting and selling at the local level during its April, May, and June drive. While consumer acceptance is at an all-time high and a large market exists in domestic and residential fields, sales of gas summer air conditioning have been hindered by the lethargy of gas utilities and by restrictions on gas for heating.

This year's campaign will make use of a brochure stressing the advantages of the load and how to promote and sell it—the "Gas Summer Air Conditioning Sales Maker" —and the consumer booklet, "10 Ways to Take a Year-round Vacation With Gas Air Conditioning." In addition, Servel Inc. has prepared a comprehensive booklet entitled "Servel Air Conditioning and You—a 'Partnership for Profit' for '52," which is now being distributed to all gas utilities. Servel will continue advertising in architectural and building magazines, with a special series in *Fortune*.

Early in the summer a series of round table conferences on air conditioning will be held, two in the Midwest and two along the eastern seaboard. Local utility representatives will conduct the meetings, and each of the four presentations will be reproduced in booklet form for distribution to the industry.

The committee will continue the AGA-Servel gas summer air conditioning progress award.

Incineration

In November the incineration committee held a meeting to organize its 1952 program, scheduled for April, May, and June. The promotion will consist of a section in the second-quarter campaign portfolio (which will also include househeating and air conditioning) devoted to gas incineration information and calling the attention of sales executives to the value of the load and the fact that gas incineration provides a new major use of gas in the home as a prestige builder.

A wrap-around satin binder for use as a display piece will be provided, in addition to a booklet devoted to how-to-do-it case histories of successful campaigns. The "Gas Incinerator Sales Maker" and the consumer booklet, "10 Short Cuts to Quick Cleanups With an Automatic Gas Incinerator," will again be offered.

Refrigeration

AGA advertising on gas refrigeration will appear in consumer magazines during the period of the campaign—June, July and August. Although the committee's organization meeting has not yet been held, 1952 activities will be patterned after last year's.

A new brochure, consumer premiums, and promotional, advertising, and publicity items will be offered, as well as the "Gas Refrigeration Sales Maker" and the consumer booklet, "10 Reasons Why You're 20 Years Ahead of the Times With a New Gas Refrigerator." In cooperation with Servel, a sales campaign for utility salesmen, distributors, and dealers will probably be sponsored.

Dealer Relations

At presstime, this committee was discussing details of a comprehensive dealer merchandising program to be financed by PAR. Objectives of the drive are twofold:

1. To encourage utilities to increase the effectiveness of their load-building efforts by building a strong dealer merchandising organization.

2. To provide utilities with a definite and well documented plan, with accompanying materials, for recruiting and training an effective dealer merchandising organization.

The 1952 program visualizes the preparation of a kit or portfolio divided into six sections, the first three being concerned with objective No. 1, and the last three devoted to the fulfillment of objective No. 2. These sections will consist of:

1. Creating increased utility interest in the need for getting dealers to be more aggressive in making gas appliance sales.
2. The printing of a number of case histories, showing how successful companies have turned indifferent dealer organizations into hard-hitting and effective gas appliance merchandisers. These case histories will be representative of the industry, including large and small companies, merchandising and non-merchandising companies, and will include complete step-by-step details and methods used in selecting and training sales personnel, compensation plans, advertising, demonstrations, service, and the progress made in improving competitive position.
3. Selecting and training of salesmen, compensation, cooperative advertising, store display policies, floor planning of merchandise in dealers' stores, financing of dealer sales, promotional activities, bonuses, employee leads, etc.
4. Presenting the gas company and its plans to dealers. This section will be built around a series of meetings sponsored by utilities for dealers and dealers' salesmen. These meetings might deal with the following topics:
   - A. Announcement of the dealer merchandising program to dealers at special meetings, presided over by a gas company sales executive. This meeting could also include a presentation of the superiority of gas as a fuel, and the profit opportunities in selling gas appliances.
   - B. A meeting devoted to the superiority of gas cooking with emphasis on automatic gas ranges, coupled with dramatic demonstrations and again stressing the profit opportunities to dealers.
   - C. A meeting on automatic gas water heaters, with emphasis on upgrading heaters, good installation practices plus gas clothes dryers, with dramatic demonstrations stressing the superior advantages, market possibilities, and profit story.
   - D. Househeating and its possibilities with emphasis on upgrading and superior features.
   - E. Optional subjects depending upon type of audience, as air conditioning, refrigeration, incineration.
   - F. Better sales technique—a review of successful selling techniques that salesmen can put to work.
5. Product training is the responsibility of the gas appliance manufacturers. The gas utility will play a major part in organizing the meetings and the manufacturers will be responsible for providing the product story on their particular brands of appliances for those attending the meeting.
6. It is believed that continuing training classes at periodic intervals are essential for the purpose of providing information on new techniques and new products.

With four AGA promotional campaigns to be undertaken during 1952, gas companies and manufacturers should consider refresher training courses as a prelude to the beginning of each campaign. Also being considered as part of the committee's program is the organization of "Blue Flame" dealers by gas companies at the local level.

To qualify, dealers will be requested to agree to a number of items such as displaying the emblem in their windows, carrying a representative stock of gas appliances, agreeing to adequately display appliances, and to attend gas company-sponsored meetings. Utilities will also be required to assist dealers in obtaining financing plans, to participate in cooperative advertising, and to assist in working out satisfactory installation and service techniques.

An important feature will be an AGA dealer consultant who will be at the service of utilities to help them in organizing local dealer programs, and to make intelligent use of materials provided by the committee.

Housing

Although the committee on housing has not completed its 1952 plans, it will undertake preparation of a brochure or portfolio including information stressing the importance of the new-home market and ways and means of selling it. This portfolio will also include case histories of local plans successfully used by gas companies in selling the architect and builder on the merits of modern gas service.

The committee will also prepare a colored booklet, along the line of the "Big Ten" series, devoted to the application of gas to the new-home market. It is intended for distribution to builders, but a special adaptation may be prepared for consumer use.

Home Service

To promote uniformity in customer instruction on the subject of broiling, the home service committee will study results of a broiler survey recently sent to home service directors. Methods now in use will be considered, and a uniform pattern will probably be established.

The committee also plans to prepare instruction sheets on how home service can best use the AGA's gas water heater and clothes dryer sales training booklets and consumer booklets.

Other future work will consist of developing safety programs for the home and reviewing the booklet, "On the Job Training for Home Service," to suggest changes or revisions. Home service representatives have been invited to serve on all major appliance committees of the residential gas section during 1952.

Improving Domestic Gas Appliances

A meeting will be held early this year by the committee on improving domestic gas appliances to review the status of its 10-point recommendations which are currently being studied by the CP range division of GAMA.

This committee, representing gas companies and CP range manufacturers, will continue its study of range requirements and will recommend upgrading when necessary.

New Freedom Gas Kitchen

Production and distribution of sales and promotional materials, including a new booklet patterned along the lines of "Modern Designs for Kitchens and Laundries," will be the chief work of the home service committee. The group will also work closely with representatives of women's, shelter, and home magazines during 1952.

Attention will be given to stimulating gas industry participation in national home shows and exhibits. As an example of the progress being made, the committee points out that 18 spaces have been reserved for gas appliance displays at the 1952 Home Builders Convention. They will consist of four New Freedom gas kitchens and laundries and 14 individual GAMA displays with ranges, refrigerators, water heaters, and clothes dryers.

Window and Store Displays

During 1952, the window and store display committee will again make available to gas companies displays and ideas, as well as estimated construction costs, color segments, and other data.

Two semi-annual issues of the "Window & Store Display Bulletin" will be synchronized with the AGA gas range promotional campaign in the spring and the Old Stove Roundup in the fall.

Accounting Section

R. F. McGlone

RALPH F. McGlone, chairman of the accounting section, anticipates a productive year in view of the many activities now underway.

A special subcommittee appointed to develop a program of training by manual and films has announced completion of the format. Work is going forward on the final draft of the scenario. The program, including financing production of the film, has been tentatively approved by the board.

An intensive effort to cooperate with NARUC's committee on statistics and accounts will be continued during 1952. The group is developing a new classification of accounts for the electric industry. An AGA special committee on classification of accounts also joined a similar EEI committee in this work. It is vital since in all sections of the classification with the exception of production, transmission, and distribution expense accounts, matters of principle adopted in the electric classification will be carried directly into the gas classification with no opportunity for debate or comment. NARUC's work on revising the gas classification is underway.

Requirements for Reports to FPC

Final requirements for annual gas company reports to the FPC will probably be issued this year and, as a result of work done by a subcommittee of the managing committee, a substantial part of the additional work burden originally proposed by the commission is expected to be eliminated. In June 1951 FPC issued a proposed draft of its Form 2, containing many new and changed requirements which would have imposed a heavy burden on industry clerical and operating staffs.

Long-range project committees, established during the past year on the basis of taking the necessary time to develop their assignments thoroughly without being hampered by convention report deadlines, are expected to produce more comprehensive reports. The program will also permit the committees to undertake investigation of more extensive subjects important to the industry.

A new committee will study electronics to keep the industry informed on progress of the science as it affects accounting, and to help guide manufacturers of electronic equipment along lines of greatest value to the industry. To fill a gap in accounting activities, the depreciation committee, defunct since 1944, is being reactivated.

Meetings of the managing committee have been put on a scheduled basis, two per year. A subcommittee has been appointed to study the entire operation of the accounting section and to recommend improvements.

The accounting developments service will continue to distribute material of value to the industry, but the group reports a severe lack of material from member companies. Accounting officers are urged to write up new developments and send them to the accounting developments service.

CALENDAR

Accounting Section

Joint AGA-EEI Accounting Conference Planning Meeting — Deshler-Wallick hotel, Columbus, Ohio, Jan. 31-Feb. 1.

Joint AGA-EEI Taxation Accounting Committees — Shamrock hotel, Houston, Feb. 11-13.

National Conference of Electric & Gas Utility Accountants — Hotel Commodore, New York, April 7-9.

Controllers Institute of America — Hotel Statler, Detroit, Oct. 5-8.

Industrial & Commercial Section

R. A. Malony

INCREASED emphasis on commercial advertising, particularly cooking, rather than on industrial applications, is reflected in allocations of the industrial and commercial gas section's national advertising committee for 1952, R. A. Malony, section chairman, reports.

Most companies are expected to have a problem in meeting industrial demand, rather than having any need for advertising or promotion in that field, so promotion efforts will be concentrated in the commercial field where competition is increasing.

In his speech at the annual AGA convention, C. P. Rather stated that PAD's policy will be to see that federal or state gas restrictions do not curtail industrial gas to defense factories. Of $176 billion authorized for defense, only $119 billion has been allocated and $33 billion spent, which indicates huge future demands for heat processing of metals for defense production. Decreased metal allotments for civilian production may lower the demand for industrial gas but this is offset by peaks created because of the tremendous househeating volume taken on since World War II.

Activities of the industrial and commercial gas section are to be considered during 1952 by nine committees. Two are promotional in the industrial field and two in the commercial field, while the others deal with special problems.

Objectives of Sales Promotion Program

Four principal objectives of the sales promotional committees are: (1) Develop up-to-date guidance to increase sales through cooperation of gas company personnel with manufacturers and dealers, including sponsorship of national sales campaigns. (2) Sponsor close relationships between AGA and leading industrial and commercial trade associations. This is presently being done with the American Society for Metals, American Foundrymen's Society, National Hotel Assn., National Restaurant Assn., and Food Service Equipment Industry Inc. (3) Study and report to industry the latest trends, techniques, and equipment involving the application of gas and competitive fuels. (4) Advise other AGA committees or departments on promotion, advertising, and research requirements.

This year's promotional program will include many activities carred on last year. A food service equipment dealer monthly sales bulletin, *Flame Facts*, conveys information on comparisons of gas and electric cooking costs

and emphasizes gas' advantages. Plans for 1952 call for carrying on the gas industry chain contact program. There are about 90 gas company men who represent the industry in regular calls on some 300 chain organizations with volume food service operations. These salesmen promote new equipment and applications and, in turn, report to gas companies plans for modernization in their territories.

Other continuing promotions are the commercial gas cooking demonstrations, "Mr. Flameless and Mrs. Flame" and "What So Proudly We Hail." Twenty member companies have indicated that they will use these during the next year. AGA provides the script and properties.

Commercial Gas Campaign Reinstated

Unless the supply situation should change drastically in the near future, a major 1952 undertaking will be reactivation of a national commercial gas sales campaign which was postponed in 1950. In spite of current metal restrictions, manufacturers of commercial gas equipment report that they have enough metals available to produce more than will be required by the armed forces, and they welcome such a campaign. Dealers also report that they need such sales stimulus.

Three committees operate in the industrial gas field: metals, industrial processing, and industrial gas practices. They all make investigations and studies leading to the production of Information Letters designed to assist members of the section. These investigations are conducted to combat competition, to better gas' position and to increase its industrial utilization, and to suggest new fields or new research projects. These committees will also augment the safety program of a new general association committee.

In the commercial field, committee work will cover, in addition to the commercial gas cooking projects already described, volume water heating, air conditioning, and commercial incineration.

Equipment improvement to meet competitive claims is a favorite objective of commercial gasmen. The committee on this subject is seeking to make automatic oven lighting mandatory on hotel and restaurant ranges. Several manufacturers have provided automatic oven pilots during the past year, and the committee hopes to make this feature standard and mandatory.

The need for adjustment to regulations and controls and intensified sales and promotion efforts is recognized by the industrial and commercial gas section but, despite these obstacles, the group looks forward to a year of progress.

Industrial and Commercial Section Chairmen

GENERAL COMMITTEES

Sales Training
L. E. BIEMILLER, Consolidated of Baltimore

Equipment Improvement
L. J. FRETWELL, Oklahoma Natural Gas Co., Tulsa

Programs and Papers
RALPH S. WENNER, Ohio Fuel Gas Co., Columbus

Displays at National Expositions
JOHN C. DORSEY, East Ohio Gas Co., Cleveland

Industrial Practices
CHARLES C. EELES, Ohio Fuel Gas Co., Toledo

Nominating Committee
C. H. LEKBERG, Northern Indiana Public Service Co., Hammond

CALENDAR

Industrial and Commercial Gas Section

AGA Subcommittee on Approval Requirements for Domestic Gas Ranges —Cleveland Laboratories, Feb. 7-8.

American Society for Testing Materials Spring Meeting—Hotel Statler, Cleveland, March 3-7.

AGA Sales Conference of Industrial & Commercial Gas — Netherland Plaza hotel, Cincinnati, April 16-18.

New England Hotel & Restaurant Exposition—Hotel Statler, Boston, April 23-25.

American Foundrymen's Society Exposition—Atlantic City, May 1-7.

AGA Commercial Gas School—Chicago, May 5-9.

National Restaurant Exposition — Navy Pier, Chicago, May 5-9.

American Society for Testing Materials Annual Meeting—Hotel Statler, New York, June 23-27.

Pacific Coast Regional Restaurant Convention & Exposition—Biltmore hotel, Los Angeles, Oct. 7-9.

National Metal Exposition — Philadelphia, Oct. 20-24.

Operating Section

H. B. Andersen

MAKING the gas industry "corrosion conscious" will be one of the big jobs of the operating section this year, according to H. Bruce Andersen, chairman. Although the corrosion committee is engaging in no basic research, it will continue to work through publicity, papers, and editorials to get more companies to make use of the known methods of corrosion control. If full advantage were taken of present-day techniques, Mr. Andersen said, the tremendous cost of corrosion in this country could be considerably reduced.

The section's chemical committee is playing a prominent part in revision of the *Gas Engineers' Handbook* and is supervising preparation of a revised edition of *Gaseous Fuels.*

Four new standards for cast iron pipe have been nearly completed by the distribution committee's subcommittee on cast iron pipe standards. They will be issued as American Standard after final approval by the ASA. Other standards for cast iron pipe are in the course of preparation.

The motor vehicles committee is working closely with EEI's transportation committee. Currently, a subject high on the agenda is economic and mechanical problems involved in the operation of motor vehicle fleets.

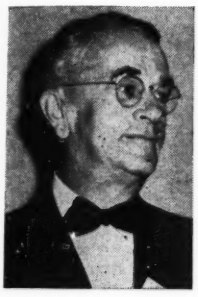
Changeover Problems Considered

With the arrival of natural gas in New England and increased supplies in the Midwest and along the eastern seaboard, the gas production committee has devoted its time to conversion problems and will continue to make the latest information available to all plant operators. Under consideration are appliance changeover provision of standby equipment and advisability of retaining coal-gas and water-gas capacity, handling of severe peak loads, relation of storage holders to new gas, substitution of natural gas for oil and cold enrichment and reforming, and details of plant operation and safe practices.

A plant waste disposal subcommittee, organized two years ago, is continuing its studies. In addition, the gas production committee has recommended formation of an air pollution subcommittee to parallel the activities of the plant waste group.

Preparation of a text for a *Purging Handbook* is to be the chief task of the purging committee during 1952. It has been a continuing project and. currently, results of a series of tests on purging a 30,000-gal. liquefied petroleum gas tank with steam are being prepared for inclusion.

PAR Committee



N. B. Bertolette

NORMAN B. Bertolette, chairman of the AGA committee on promotion, advertising, and research, reports that segregation of problems through VIC (venting, ignition, and combustion) analyses has proved valuable because a number of concomitant problems and areas of sparse or no information have been revealed. A number of these problems are currently being attacked.

Other projects—some 15 of them—are concerned with the utilization of gas for cooking, water heating, househeating, air conditioning, and general utilization.

Under gas measurement, the accuracy of current meter installation practices is being investigated. This work may be considered an extension of earlier work that led to the publication of Gas Measurement Report No. 2, the acknowledged basis for orifice meter measurement in this country. Now about two-thirds completed, the project has investigated the effect on metering of plug and globe valves, impulse tap location, run roughness, etc. In view of these experiments, Report No. 2 will be revised if that seems desirable.

Newly initiated, a project to test the extrapolation of meter factors to meter runs up to 30-in. diameter is progressing rapidly. This project was begun because of a growing trend to larger runs used in checking gas transmission. Current plans include the operation of a single 30-in. meter in series with eight parallel connected 10-in. meters.

The uncertainty which attends extrapolation will be resolved, and large meter operation can then proceed with confidence based on actual data. The meter projects are jointly sponsored by AGA and ASME with the cooperation of equipment manufacturers, pipeline companies, and government agencies.

Other projects now under way are studies of gas well deliveries, characteristics of natural gas condensates, and development of factors affecting storage and separation of natural gas and its components.

A report to be published soon will be a valuable addition to the production engineer's library, containing under one cover all salient factors involved in oil cracking and their relationship to the cracking process. For the future, the pilot plant work on coal gasification and fundamental studies of the reactions involved in the gasification of coal will be continued.

Supplementing Natural Gas Supply

Thus, the problems of providing high-Btu pipeline gas from coal, for peak load, and against the day of diminishing natural gas supplies are being viewed from two approaches—one, a unique process to provide the synthesis gas for methane, and the other to find out about these involved reactions with the aim of betterment. Allied problems such as interchangeability, sulfur removal, catalysts, etc., are also under investigation.

PAR's usual procedure is to plan promotion and advertising activities a full year ahead. This year the international situation has hampered the committee's coordinating its activities with those of manufacturers and utilities, some of whose plans are considerably more advanced. The general promotional planning committee, however, feels that barring all-out war, complete plans should be made. Commitments for 1952 activities will be made as much as nine months in advance.

Early difficulties in the very important ignition field test program have all been corrected, and a preliminary appraisal of the program shows that no great service difficulties have developed and customers using the ranges seem satisfied. The program is credited with hastening the improvement of such devices by at least three years, and the best testimonial to its success is the announcement by several firms that ranges equipped with these devices will be promoted extensively early in 1952.

CALENDAR

Operating Section

National Assn. of Corrosion Engineers—Galveston, Texas, Week of March 10.

Greater New York Safety Council Annual Convention & Exposition — Hotel Statler, New York, April 1-4.

AGA Distribution, Motor Vehicles & Corrosion Conference—Benjamin Franklin hotel, Philadelphia, April 7-10.

AGA Production & Chemical Conference—Hotel New Yorker, New York, May 26-28.

40th National Safety Congress & Exposition of National Safety Council, Chicago, Oct. 20-24.

Experiments in Cathodic Protection For Large Storage Tank Bottoms

By LOUIS A. SNYDER
Electrical Engineering Consultant

This article, adapted from a paper presented by Mr. Snyder at the California Natural Gasoline Assn., describes experiments in applying cathodic protection to the undersides of large tanks.

In scope it is similar to the article by E. H. Grebstad and T. H. Gilbert which appeared in April 1951 GAS under the title, "How Cathodic Protection Was Applied to the Underside of a Water Seal Holder." While this study concerns liquid-holding tanks, its techniques may be applied to utility facilities as well.

ONE of the most practical methods of retarding corrosion on metal structures buried in the soil or submerged in water is the application of electric counter-currents flowing continuously to the structure to maintain a cathodic state.

Basic to all proper corrosion control technique is the determination of true potentials. These values may be accepted and obtained by application of the following principles:

Sufficient current must flow from the soil or water to the structure to maintain a constant voltage of .85 or greater between the structure and a copper sulphate electrode in contact with the soil or water.

It may be noted at this point that resistance as referred to throughout this article, is expressed in ohms/cm^3 measured with a shepherd rod.

A company with which I was formerly affiliated has a number of 80,000- and 100,000-bbl storage tanks that were built from 1923 to 1926. In the early part of 1948, leaks had developed in several tanks and a new bottom had to be installed in one of them.

The corrosion was all external and was not always uniform. The most corrosive spots were where the roof support columns rested on the bottoms, causing better contact with the soil, and around the outer circumference of the bottom from the perimeter in for a distance of approximately 15 ft.

Patches were cut out of the bottom at about 40 locations for inspection and soil resistance testing. It was found that soil resistance increased toward the center of tank; and, in some tanks, at the perimeter the soil was 500 ohms less than at the center. In all tanks that were inspected, the soil was much dryer at the center than at the perimeter. The original foundations were unoiled dirt and sand.

It was decided in December 1948 to take one 80,000-bbl tank for experimental purposes, as the information available for protection of large tank bottoms for external corrosion at that time was not very convincing.

The pipelines run from pipe trench to tank, and insulating material was installed at the flange joints. The foam lines were insulated with armored insulating couplings.

The first test was with five 2-in. x 80-in. graphite anodes, with graphite backfill spaced 60 ft from the tank and equidistant around it.

Soil resistance was from 1500 to 3000 ohms.

Current of 10 amperes was applied. After several days, tests were taken at a number of locations around the perimeter of the tank and potentials were from 1200 to 1500 millivolts.

One foot below the bottom, an 8-in. horizontal hole was drilled, running to the center of the tank. During the drilling, potential tests were taken at approximately 10-ft intervals. At the first 10-ft check spot the potential did not drop much but from there on to the center of the tank the potential dropped evenly and was 690 mv at center of tank.

In the second test, an old out-of-service buried pipeline, located approximately 300 ft from the tank, was used for an anode. Current was increased gradually for several weeks and at 28 amperes the potential was 2000 mv at the perimeter and 800 mv at the center of the tank.

For the third test, 8-in. holes 56 ft long were drilled at an angle of 30° under the tank. Five 2-in. x 8-in. graphite anodes with graphite backfill were placed in the holes and backfilled with soil mixed with salt water. Current of 18 amperes was applied and after 24 hours potential tests were taken; the center was 850 mv and the perimeter was 1000 mv.

Two and one-half years after cathodic protection had been applied the tank was opened up for a clean-out. Ten patches were cut out of the bottom for inspection. The metal had no indication of any active corrosion and all the old pits were inactive.

The anodes were operating at approximately their recommended capacity and the resistance from the anodes to remote earth had not changed. Acting on this information it was decided in November 1948 to protect nine 100,000- and three 80,000-bbl tanks that were all in one area, spaced approximately on 350-ft centers. This work was completed in January 1949.

The surface soil resistance varied from 250 to 3000 ohms.

Most of the pipelines connected to the tanks run in pipe trenches or were on top of the ground but a number of them were buried through the fire walls. No attempt was made to protect the pipelines as this was to be a secondary consideration.

The 80,000-bbl tanks had approximately 11,000 sq ft of bottom and the 100,000-bbl tanks, approximately 14,000 sq ft. The 80,000-bbl tanks were all in one group and were located on 250-ohm soil.

One rectifier was installed for the three 80,000-bbl tanks and one rectifier for each three of the 100,000-bbl tanks.

Five 2-in. x 80-in. graphite anodes were installed under each 80,000-bbl tank and eight 2-in. x 80-in. graphite anodes under each 100,000-bbl tank. The anodes were made into package units; thin canvas bags, 6½ in. x 10 ft, were made. The anode was placed in the center of bag with 1 ft of graphite backfill on top and under the bottom of anode.

Three 100-lb sacks of salt were dissolved in water for each hole. This solution was carried to the bottom of the hole with a hose. After water had soaked into the soil, the anode units were installed by using a long pole to slide them to the bottom of hole.

Screened soil was mixed with salt water into a thin mud; a 2-in. hose was run down hole to the top of the anode and the mud was forced around the anode with compressed air. The holes were backfilled for 2 or 3 ft on top of

od Protection

an bottoms

the anodes but the balance of hole was not filled.

At the top of each hole, a piece of ½-in. pipe 5 ft long was placed with its upper end 4 in. above the grade. Then the holes were sealed off with brick and soil. This permitted the chlorine gas to escape through the pipe to eliminate gas locking of the anode.

Although some of the holes were left open for some time for checking, the soil was very hard sand and clay and did not cave in.

The average anode to remote soil resistance was 4.2 ohms for the 80,000-bbl tanks and 5.9 for the 100,000-bbl tanks.

The anodes for the 100,000-bbl tanks averaged 2.41 amperes per anode and the 80,000-bbl tanks averaged 1.67 amperes.

A maximum current density on the anode rod surface proper of 1.0 ampere per sq ft is permissible with graphite backfill. The anode leads were run to small, water-tight cast connection boxes located on the concrete ring that extended outside of the perimeter of the tank; connections were made to main feeder wires in the boxes. It was estimated that 300 lbs of salt per anode would last 20 to 25 years with a dissipation of 3.5 amperes per anode; this information was furnished by the National Carbon Co.

It required 1.38 ma per sq ft to protect the 100,000-bbl tanks and .76 ma per sq ft to protect the 80,000-bbl tanks. The potentials were taken under the center of one 80,000-bbl and one 100,000-bbl tank and were the same as the perimeter of the tanks. The minimum potential on the 12 tanks was 924 mv and the average was 1100 mv.

The current may be reduced at a later date if the potential remains the same.

The pipelines were all insulated from the tanks and potentials were taken on the outside of insulating joints before and after current was applied. Resistance shunts had to be installed across some of the insulating joints to restore the original potential. The anode installation and wiring was calculated for an estimated life of 20 years.

The rectifiers were oil cooled, vapor and water tight, with a capacity of 30% more than the required current and 20% more than the required voltage. The extra current capacity may be used at a later date to protect some of the pipelines passing through the fire walls.

The average installation cost per tank was $1500.

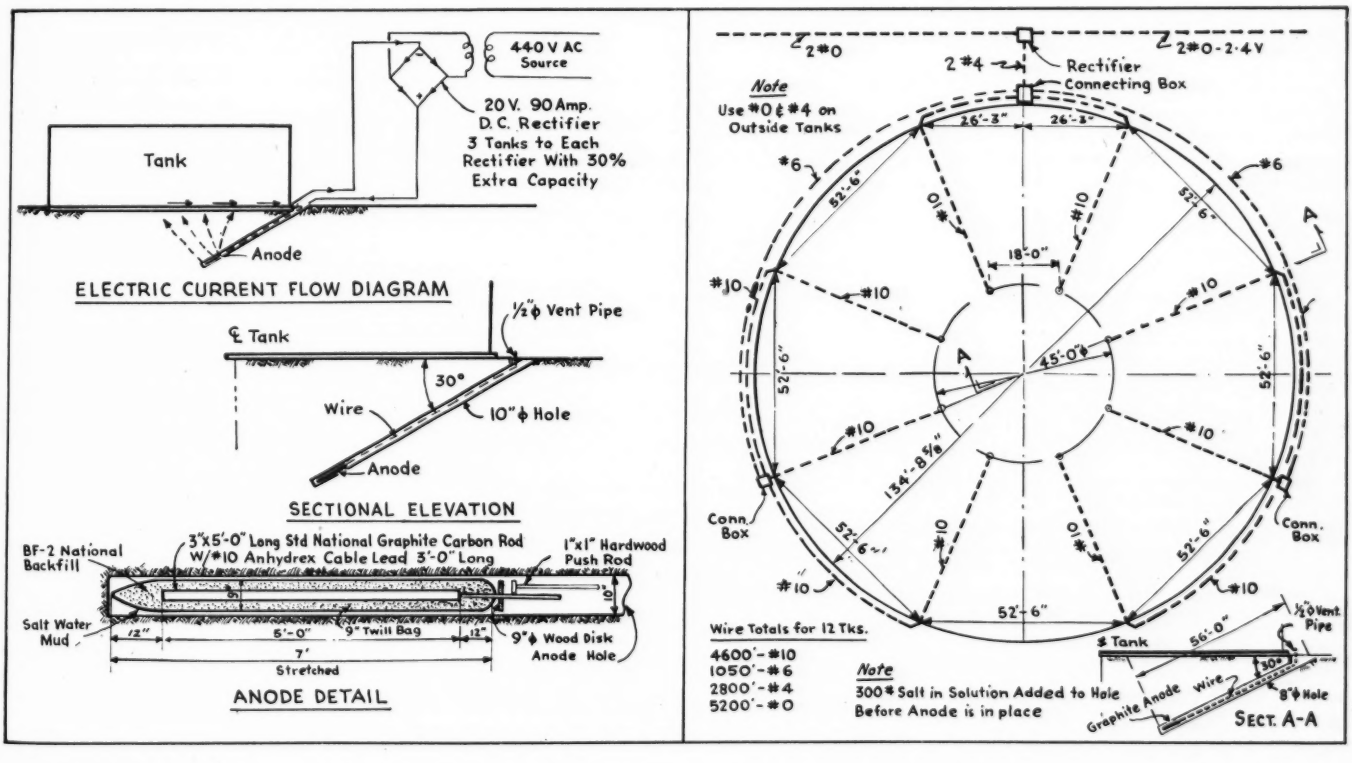
The power consumed per tank per month for the 100,000-bbl tanks was approximately 410 kw and, for the 80,000-bbl tanks, was approximately 88 kw.

The average line voltage at the rectifiers for the 80,000-bbl tanks was approximately 7 volts, and for the 100,000-bbl tanks was approximately 14.3.

After 18 months of cathodic protection on the 12 tanks, the resistance of the anodes to remote earth remained the same.

There had been no opportunity to inspect the bottoms at that time. However, it is believed that this type of anode installation is superior to placing them at a remote distance from tanks. There is a more positive equal distribution of current and potentials are more equal between the center and the perimeter of the tank. The voltage can be lower with a minimum of anodes which will reduce power costs. There is less migration of current to foreign lines. The anodes will not be disturbed under the tank. This type of installation would permit the protection of large tanks in congested areas.

The initial cost is more but over a period of 15 or 20 years, it should be about equal.



Standard anode details are shown at left, anode arrangement at right. Drawing is for a 3-in. x 60-in. anode, as the manufacturer has used this size to replace the 2-in. x 80-in. mentioned in the text. Details are the same except for the hole and bag dimensions.

RADIANT HEATING Part 1

Fast Growing . . . Versatile . . .

By OSCAR SHEFLER

Churches. *Design considerations, from both esthetic and comfort standpoints, demand features which radiant heat affords.*

Introduction

Fourteen years ago, radiant heating was almost unknown in America. References to its successful use in European buildings, and to its long and honorable history, were dismissed with a skeptical "I'll believe it when I see it work" attitude.

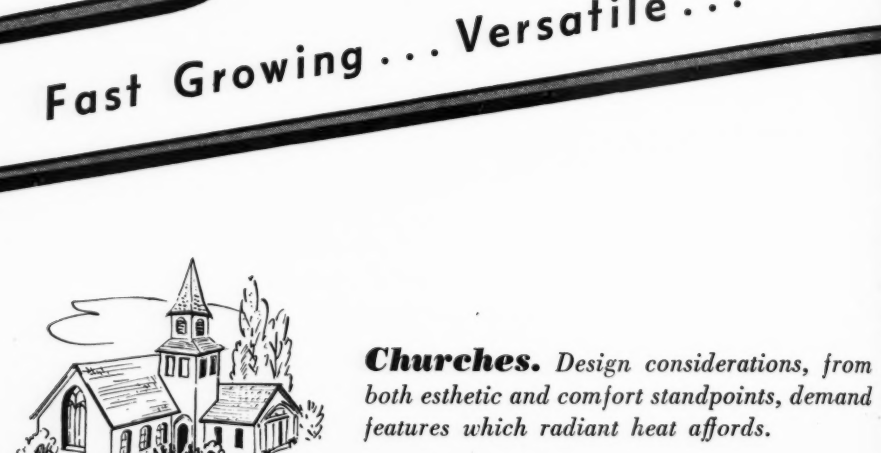
Today, radiant heating is an engineering fact. Hardly a town in the U. S. is without it; every important contractor in the country has the know-how required to install it. More than 1000 radiant heating systems go in every month.

That this is so can be attributed in a large measure to the efforts of one firm, A. M. Byers Co., Pittsburgh, America's largest manufacturer of wrought iron.

The company's interest may be said to have begun in the late '30s when Frank Lloyd Wright designed an office building in Racine, Wis. that incorporated many of the latest developments in architectural construction — including radiant heating.

About that time, the Byers firm initiated a system of collecting, filing, and analyzing radiant heating data that has resulted in the greatest fund of information on that subject available anywhere today.

A study of these files reveals that radiant heating has been incorporated in almost every conceivable type of structure, from dog kennels to skyscrapers. Its most common use, of course, is in residences, but the list extends to thousands of commercial, industrial, and institutional buildings.



This 200-year-old Maryland church began its third century with radiant heating. Concrete floor slabs containing wrought iron pipe were insulated from outside walls by a ¾ x 18-in. insulating board.

ONE of the fastest-growing areas for radiant heating in recent years has been that of church construction. In one city alone, with a population of less than 200,000, nine church buildings have adopted radiant heating in the past seven years, and three more are under construction. Elsewhere, the trend is similar.

The reasons are apparent. The church has the oldest traditions of any field of architecture, and those traditions don't call for radiators. In addition to considerations of design, moreover, churches raise certain problems in heating that are not encountered anywhere else.

High overhead areas, for instance, make the church especially suited for a system that heats from the bottom up.

Convection losses from ordinary heating systems in the usual high-ceilinged auditorium are a considerable item of expense. These same upper areas, being cooler, help to dissipate the excess heat load caused by the sudden influx of churchgoers on Sunday morning.

Another factor is the reduction of air currents, with the accompanying reduction in wall and ceiling streaking, a major consideration in churches, where redecorating costs eat great chunks out of the congregation's budget.

In multi-storied churches, case after case has demonstrated that radiant heating need not be restricted to the ground level. One example is a church in upstate New York, where the basement is at ground level and the first floor is correspondingly raised. Both floors have radiant heating systems employing wrought iron coils embedded in concrete.

An example of how an old church can be provided with radiant heating is furnished in the case of a 200-year-old church in Maryland. Here, wrought iron heating pipe was laid on a crushed rock base, and concrete poured over it. The concrete floor slabs were insulated from the outside walls by a ¾-in. by 18-in. insulating board.

The boiler is located in the parish house. Room temperature is controlled by two modulating thermostats directly operating two modulating valves. These are located in the sides of pews in the aisle, 2 ft above the floor. During the week, church temperature is maintained at 55° F. To compensate for carpeting under the pews and a large wood decking in front of the altar, the piping was laid on closer centers than is usual in installations which use no floor coverings.

A study of various church installations, as recorded in the Byers files, is rewarding as a demonstration of how various factors can be manipulated to provide the versatility needed in any large structure. One church is divided into eight heating zones, regulated by Minneapolis-Honeywell controls. The zones are divided on the basis of function, so that social, recreational, educational, and other activities can be carried on without heating unused areas.

Other churches show how pipe spacing can be varied to comply with variations in heating requirements. In the entry, for instance, where the minister must often stand near a doorway to greet his congregation, a typical scheme calls for 1¼-in. pipe laid on 12-in. centers.

In brief, radiant heating offers the church builder a system that is economical, clean, and comfortable, and that is more compatible with the requirements of church design than practically any other system.

Schools. *Warm floors, efficient use of space are primary requirements for this type of heating installation.*

RADIANT heating has been gaining in popularity for school construction in almost every section of the country. This is partly attributable to the fact that educational buildings have been in the van in embodying the latest in architectural developments, and it is partly due to the general acceptance of radiant heating.

The banishing of pipes from exposed areas has made for trouble-free corridor and classroom spaces. This is especially important in schools for younger children, who go crowding from room to room without always watching where they step. For these small fry, too, it is a matter of great convenience to have a warm floor for them to sit on while playing. Kindergarten teachers have found that children can be bedded down on the floor during rest periods without the usual danger of colds.

An elementary school near Philadelphia completed recently consists of a low, rambling 23-room building. Its classrooms are 24 by 44 ft or equivalent, in contrast to the standard 24 by 30 ft. To keep students warm, the builders specified radiant heating.

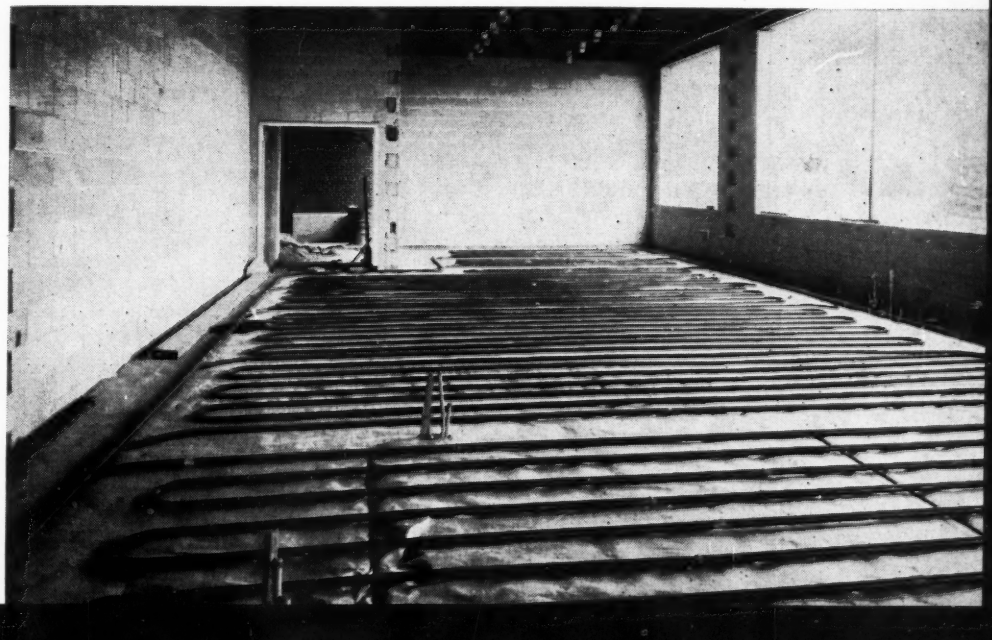
At the other end of the educational scale, there is the new student union building on the campus of one of the Big Ten universities. A two-story structure containing an amphitheater, meeting room, ballroom, and music and library rooms, the building is radiant heated throughout.

The ballroom presented the most difficult problem of all. A 1-in. concrete floor was covered with ½-in. floor board insulation. Wrought iron pipe coils were laid on the insulation, 2-in. furring strips were laid, and a double wood floor was nailed to the furring. Elsewhere in the building, the usual simple concrete slab construction was used, with a variety of floor coverings —asphalt tile, parquet wood, carpets, and pads. This diversity of floor coverings was compensated for by using a corresponding diversity of water temperatures.

In Springfield, Mo., a radiant heating system for a small school proved so satisfactory that it was extended to service two new classrooms. This is not an outstanding example, but it is typical of many like it, where an installation worked so well that another school board was converted to radiant heat.

The president of the Springfield school board was able to point to a substantial reduction in absenteeism because of colds, attributing this, partly at least, to the fact that the children's feet were warmed and dried after they had been playing in the school yard.

Elementary school recently completed near Philadelphia consists of a low, rambling 23-room building with radiant heating throughout. Its classrooms contain 1056 sq ft, as compared with a standard 720.



Garages. *Prodigious heat losses and cold floors must be combatted in order to keep employees satisfied.*

Floor area in this Salt Lake City garage is 7300 sq ft. Pipe requirements were calculated on assumption that 1 sq ft of embedded wrought iron pipe would transmit 3.5 Btu/hr per degree of temperature difference, water to air.

NOW that the manpower situation is becoming tight again, many garage owners are discovering that finding competent help is the same headache it used to be. One garage owner solved the shortage by advertising the fact that his shop was radiant heated.

Large doors that must be opened many times a day create a prodigious heat loss that is quickly recovered through the use of radiant heating. More important to the mechanic, the floor, where he does a lot of his work, is always warm.

With this in mind, the owners of a giant sales and service building—belonging to the oldest dealership in Iowa—adopted the newest system of heating. Islands and openings in the floor were accounted for by proper arrangement of the piping.

One of the case studies in the Byers files concerns a radiant heating installation in a Salt Lake City garage.

The building is of brick, with 8-in. walls, unfinished on both sides except in the office area, where interior plaster was applied. The roof is 1-in. gypsum plank covered by a mineral surface mopped on. The floor is a 6-in. reinforced concrete slab, poured over removable forms on a 6-in. gravel fill with sand top. The 6-in. square mesh reinforcing was placed within ¾ in. of the slab bottom and within 1 in. of the slab top, thus sandwiching the grid.

The building houses a service shop with 5552 sq ft of floor space, two offices, a parts stockroom, and two rest rooms, one of which includes locker space. The total floor area is approximately 7300 sq ft.

Heat losses were calculated in the same manner as would be used for conventional heating systems and in accordance with principles for load determination as outlined in the *ASHVE Guide.*

Design temperatures were as follows:

Office	70° F
Parts department	65° F
Service shop	60° F
Outdoor	0° F

In calculating heat loss to ground, an additional 30% was added to the total of all conductance and infiltration losses above the floor, with the resultant estimate of heat losses:

Main shop areas	386,000	Btu/hr
Main entrance area	15,100	
Offices	31,050	
Locker and rest rooms	16,550	
Parts department	40,700	
Total load	489,400	Btu/hr

With a 65° base, Salt Lake City's heating season approximates 5555 degree-days. The lowest recorded temperature is minus 20°. The average temperature for a 267-day season is 44.2°.

In the design of the heating coils, conforming to general practice, it was assumed that each square foot of embedded wrought iron pipe surface would transmit 3.5 Btu per hour, per degree of temperature difference, water to air. On this basis, the pipe requirements were calculated as shown in *Table 1.* A mean water temperature of 145° was selected.

The system was designed on the basis of a 10° drop in water temperature from supply to return to boiler, making necessary about 98 gpm circulation.

The installed cost of the complete radiant system was approximately 55 cents per square foot of floor area, which represented 10% of the building's cost, less plumbing. (Unit heater bids, also received, amounted to 9% of building cost, less plumbing.)

In the first full heating season, the lowest outdoor temperature was 10°. An estimate of fuel consumed indicates that from 15 to 20% less fuel was consumed than was required for similar buildings heated conventionally.

After the system had been tested in service, the designer said, "Management and employees have been more than satisfied with this type of heating. We visited the building when the outside temperature was about 10° and found it more comfortable than any we have ever encountered."

TABLE 1. Pipe Requirements

Area	Load Intensity (Btu/hr/sq ft of Floor)	Lineal Feet of Pipe	Pipe Size (In.)
Shop	73.5	3100	1¼
Entrance	63.5	167	1
Offices	84.0	345	1
Rest room*	212.0	44	1
Parts department	71.5	450	1
Locker room	114.0	140	1

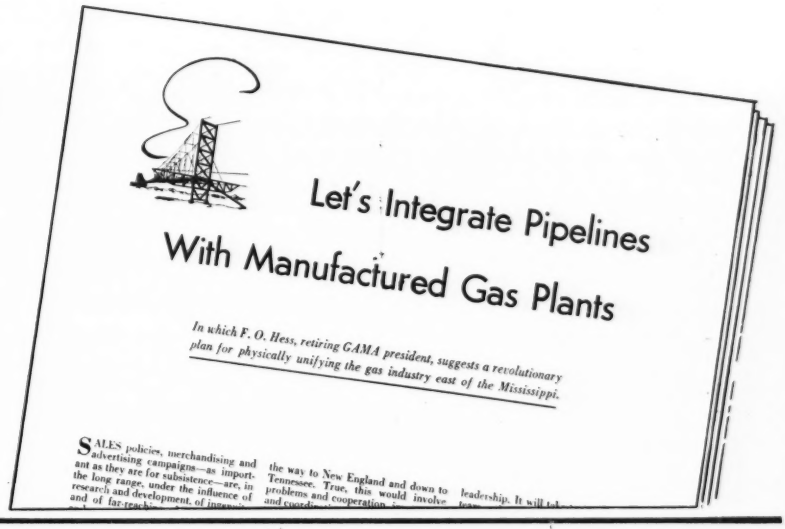
*Because of the stack in the corner of this room, it was felt that the floor coils would not have to carry this unusually severe load.

RADIANT HEATING Part 2

Next Month. *Mr. Shefler will discuss three other important applications of radiant heating — in poultry houses, aircraft hangars, and hospitals.*

Should We?

Twelve of 13 gas executives believe the possibilities should be explored further



Let's Integrate Pipelines With Manufactured Gas Plants

In which F. O. Hess, retiring GAMA president, suggests a revolutionary plan for physically unifying the gas industry east of the Mississippi.

SALES policies, merchandising and advertising campaigns—as important as they are for subsistence—are, in the long range, under the influence of research and development, of ... and of far-reach... the way to New England and down to Tennessee. True, this would involve problems and cooperation ... leadership. It will tak...

IMMEDIATE study should be started by the American Gas Assn. to determine the feasibility of a more complete integration of natural gas pipelines and the erection of large gas manufacturing plants to distribute a mixed gas through these systems. This study should be undertaken on a pilot basis.

Such is the consensus of a dozen top utility executives from the eastern and midwestern sections of the United States.

While expressing caution, the majority of these men feel that the suggestion that such studies be made, as proposed in the address of F. O. Hess before the AGA convention in St. Louis last October, should be given careful and serious consideration.

A. W. Conover, president of Equitable Gas Co., Pittsburgh, sums up this attitude in these words:

"This whole problem could well stand intensive research *now* rather than wait until the need is more pressing."

The suggestions of the recently retired president of GAMA, incorporated in an adaptation of his address which appeared in the November *GAS*, centered about a scheme to physically unify the entire industry from Kansas City east. In essence, he was recommending the investigation of the problems, costs, and potentialities of interconnecting all pipeline systems in the area; of developing an auxiliary gas supply available from the eastern half of the United States to help winterload problems, industrial gas requirements, combustion problems, and appliance and service situation; of using the productive capacity of these auxiliary gas supply plants to produce a gas containing hydrogen to be mixed at all times with the natural gas in the pipeline system in order to augment supply and to improve burning characteristics, to unify the Btu content and combustion performance, as well as to prepare the distribution system for standby supply; to provide standby capacity for meeting peaks; and to make gasoline from this standby capacity in off-peak seasons.

GAS sent copies of the article to top gasmen in the area that would be directly affected by such a program and asked for their reactions. For the most part, respondents were not at all certain that the idea was workable, but neither were they convinced that it was *not* workable. Almost all felt it should be researched. If proved feasible, particularly from an economic point of view, it was considered by most as a promising solution to some of our most pressing supply and combustion situations. Only one of the 13 felt definitely that it was out of the question.

Quotations from the letters of eight of the 13 follow.

Justin R. Whiting, chairman of the board of Consumers Power Co., Jackson, Mich., feels the matter of interconnection of facilities might better wait until the other aspects have been explored further.

"We in this company support wholeheartedly a research program which has as its objective the development of new and better uses of gas, including new and improved appliances and new gas home devices. We likewise support a research program designed to find a low cost way to manufacture and mix the manufactured gas with natural gas.

As to the third item of research designed to bring about interconnections on a broad basis contemplated by Mr. Hess, we feel that the present natural gas integrated systems have been a step in the interconnection direction. If and when the research item suggested is successful, then it would be time enough, it seems to us, to consider the third phase of interconnection.

Justin R. Whiting

Stuart E. Crocker, chairman of the board of the Columbia Gas System Inc., has "already given the subject a lot of thought." But he foresees possible economic difficulties that will take a long time to solve.

"After reading your reprint and discussing it with some of my associates, it would seem that he is proposing a program which will take many years to develop. I think Mr. Hess is on the right track and we have already given the subject a lot of thought.

The proposed undertakings will require a lot of money which I doubt can be generated within the gas industry under present principles of regulation. As you know, coal gasification and hydrocarbon synthesis processes are under intensive investigations by various agencies and there are many new and untried ideas on the horizon. Consequently, large research expenditures will be made before the construction of full-sized plants is undertaken. If dur-

ing that time utility regulation has not been adjusted, the problem of raising the necessary capital requirements within the industry will be serious.

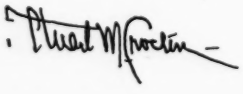
While my own thinking about the future is much along the lines which Mr. Hess proposes, I can see no reason now as Mr. Hess suggests to lower Btu standards with consequent loss in pipeline capacities, since it is possible to manufacture 1000-Btu gas which is comparable in burning qualities to the natural gas we are supplying.

High Load Factor Best

The necessary investment per Mcf of capacity is so great it would appear that gasification plants should be operated at relatively high load factors: however, in some instances peak load plants may prove practical if other products are made during off-peak periods.

This relationship will indicate whether or not our gasification plants will be located either near the coal fields and transmission centers or adjacent to markets. The sale of by-products to lower gas costs should be approached cautiously, since these gasification plants are so huge that the by-product market may be easily saturated with consequent loss of such credit.

You can see these are complicated economic relationships which will take a long time to solve, particularly since the processes of coal gasification and methanization are changing rapidly.



A. W. Conover, president of Equitable Gas Co., Pittsburgh, looks carefully at both sides of the question before concluding that research is needed now.

"Mr. Hess, in his talk, certainly brought out ideas that are controversial. How practical they might be is questionable. Obviously, it appears that Hr. Hess' thinking is influenced primarily by a desire to have something done which would be *good* for the manufacturer of gas appliances, and such an approach on his part is understandable.

If all the gas distributed by all utilities over the wide area he contemplates were identical as to heating value, gravity, and general make-up, the appliance manufacturers would definitely be benefited, but I doubt if that advantage alone (to the appliance manufacturers) would be large enough to offset the cost of so doing on the part of the pipeline companies and the distributing utilities.

The consumer would gain in the reduced prices of appliances, and it probably could be argued that the consumers' service would become more uniform and more dependable, but would it not also be true that the cost of rendering the service on the part of the distributing utilities would mount appreciably?

However "fantastic" the ideas embodied in Mr. Hess' talk may seem at first blush, I'm not so sure but that he has something. Every major improvement in any art seems fantastic, or at least impractical, at first. Perhaps we cannot go the whole way as suggested here, but some serious study by the right group of people could very well result in definite recommendations for practical interconnections (where they do not already exist), and even more advantageous use of manufactured gas plants and/or pipeline gas for peak shaving on the part of both manufactured and natural gas utilities.

Storage of Manufactured

While Mr. Hess does not specifically suggest underground storage of manufactured gas, it seems that such an approach would be a part of his general idea. The possibility of such storage of manufactured gas both prior to and after enrichment should, I believe, be studied more carefully, not only as it relates to present needs, but also as a means of helping to supply distant future requirements as natural gas gradually declines in volume or increases radically in cost.

If someone could come up with a low cost process for making hydrogen to bring the gravity of higher heating value manufactured gas down to natural gas levels, then such a mixture could be variable and still be more completely interchangeable. This whole problem could well stand intensive research *now* rather than wait until the need is still more pressing.

George Mitchell, president of the American Gas Assn. and the Peoples Gas Light & Coke Co., Chicago, is largely noncommital; but he does drop a hint that thorough discussion and consideration are in order.

"Not only did I hear Mr. Hess make the presentation, but I have read his paper several times since.

It will provoke a great deal of discussion not only in the gas industry, but also in many other industries whose business will be affected by such a plan as outlined by Mr. Hess. There will be discussions for and against certain phases of the program, but there are usually three sides to every question—your side, the other fellow's side, and the correct side. Only thorough discussion and consideration can help arrive at the correct side.

Mr. Hess is one of those unusual individuals whose mind takes him far into the future and I, for one, wish we had more Hesses affiliated with the gas business.

J. A. Clark, president of Hope Natural Gas Co., Clarksburg, W. Va. isn't convinced that the time is ripe—although the timing, he says, is "open to argument."

"The idea of a totally interconnected system covering the entire eastern area of the country where the majority of the consumption takes place is very probably something that will happen some day, and in my opinion probably 20 years from now.

If you remember, the Standard Oil Co. of New Jersey and the Pittsburgh Consolidation Coal Co. had a joint research plant just outside of Pittsburgh with the idea of determining costs of converting coal to gas and of getting some rough ideas on the comparison of costs.

This plant was abandoned about a year ago with the final conclusion that the cost of making this gas would be in the neighborhood of 60 cents or more per Mcf, and that with present day prices of gas the use for it was probably 20 years away.

I feel that ultimately the day is coming when the idea of an interconnected system covering the entire East is going to be practicable, but I think it is probably the better part of a decade ahead. Whether we should start experimental work at the present time with this timing in view is open to argument.

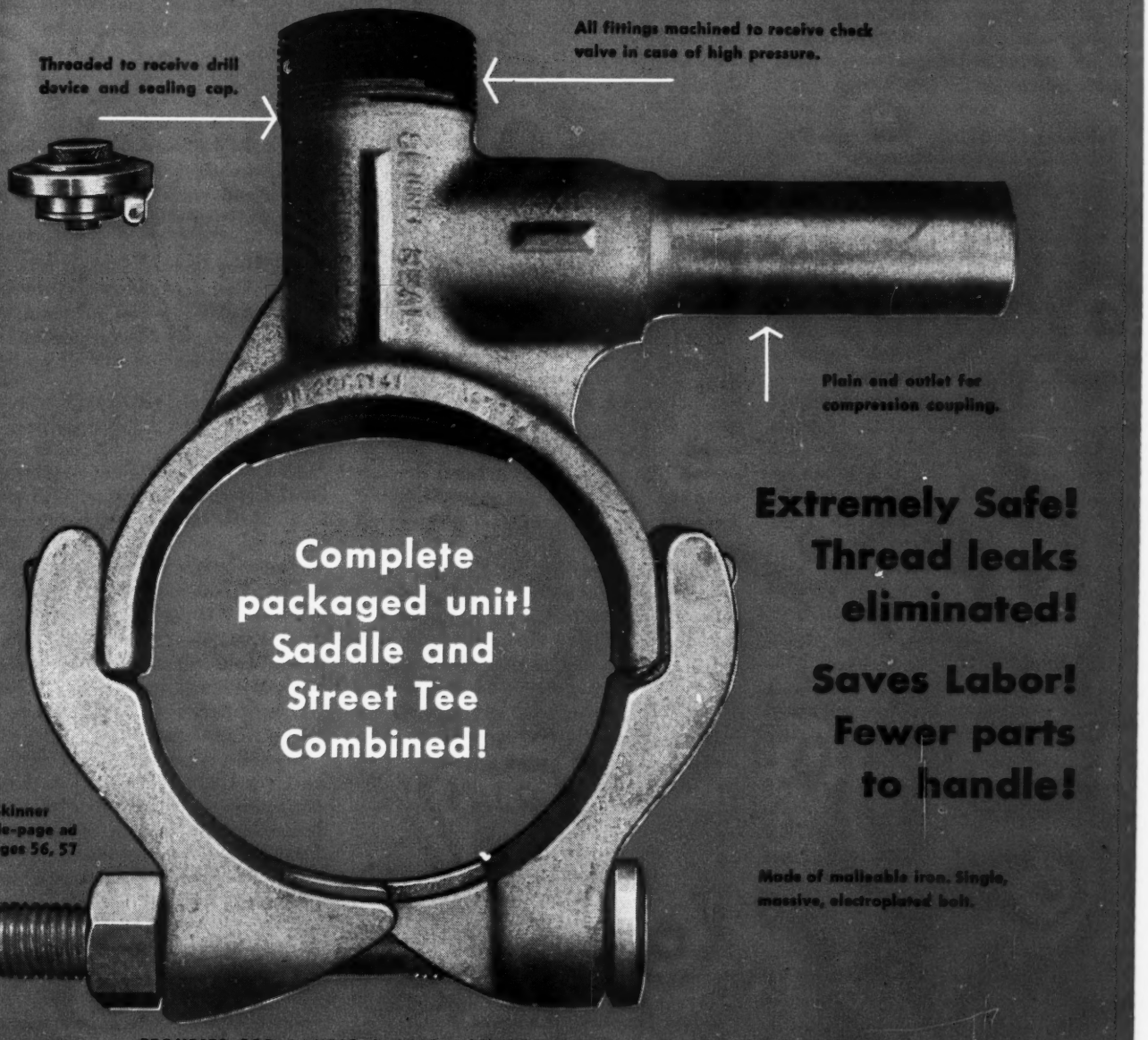
Another eastern utility executive, evidently stimulated by Mr. Hess' proposals, envisions some concomitant advantages of a study of the plan.

"Mr. Hess made an outstanding address at the AGA convention in St. Louis. The suggestions he presented are provocative and challenging. They merit and should receive careful consideration by the industry. However, I do not think the pages of a tech-

Announcing the new—

SKINNER-SEAL

COUPLING SADDLE


Threaded to receive drill device and sealing cap.
All fittings machined to receive check valve in case of high pressure.
Plain end outlet for compression coupling.
Complete packaged unit! Saddle and Street Tee Combined!
Extremely Safe! Thread leaks eliminated!
Saves Labor! Fewer parts to handle!
See Skinner double-page ad on pages 56, 57
Made of malleable iron. Single, massive, electroplated bolt.

REQUESTS FOR SAMPLE SADDLES, ON COMPANY STATIONERY, WILL BE HONORED

M. B. SKINNER COMPANY, SOUTH BEND 21, INDIANA, U. S. A.

SKINNER-SEAL COUPLING SADDLE

nical journal are the proper place for the type of consideration I have in mind. It is my opinion that his technical suggestions should be referred by the PAR committee to the general technical research committee for full study and report.

Mr. Hess states that "sales policies, merchandising and advertising campaigns . . . are, in the long range, under the influence of research and development . . . Research might, therefore, well deserve a greater portion of our attention." I consider this point fundamental and of great importance to the gas industry.

He suggests an exhaustive study aimed toward the integration of our gas fuel supply system and correction of some of its growing ills and pains. In this connection he makes two principal suggestions.

Exhaustive Study Suggested

The first is for extensive interconnection of natural gas pipelines. No one can take issue with him that the result would be beneficial to the public, the national welfare, industry in general, and the gas industry itself. Such an arrangement would insure the maximum benefit from pipeline capacity and from available underground storage. It would insure the same type of dependable continuous service that has been for so long associated with manufactured gas operations. It is true that a number of interconnections already exist and the present steel situation would not permit much to be done in this direction for some time. However, acceptance of this proposal as an aim of the industry would give impetus to the spreading of such interconnections.

The second major suggestion proposes the erection of large gas plants near coal reserves at strategic points of the integrated fuel pipeline system. By way of illustration, Mr. Hess mentions the possible distribution of a uniform 800-Btu mixed gas for the entire eastern gas industry. Here he gets into controversial matters. However, the important thing to me is that he has forcibly brought before the top leaders of the industry the matter of producing high-Btu gas from coal. The technical people know that considerable work on making synthesis gas from coal for oil production has been receiving considerable attention from the Bureau of Mines, the coal industry, and the petroleum industry.

The gas industry has done some work in this matter and at present has a pilot plant for coal gasification in operation in Chicago. Compared with the millions being spent by these other agencies, our effort to date can be considered extremely small. It has been considered as a long-range problem. The research committees of the gas industry are following closely the work done by these various agencies.

Our research work has been limited by the funds available. If greater funds could be obtained, the results could be of considerable value to the gas industry. We could take on projects which tie in with the work already being done, slanting our efforts toward our own needs.

Mr. Hess' presentation can serve the function of crystallizing our long-range plans for producing high-Btu gas from coal. I believe the best interests of the industry can be served by having his suggestions referred by PAR to its various committees for a full report requesting information as to whether there is work along these lines that we should do now and what funds would be required.

. . . . . .

A prominent eastern utility executive who has asked that his expressions be kept anonymous agrees that a "limited area" study would be a good idea. Financial support from outsiders, however, is felt necessary.

"I believe Mr. F. O. Hess is very forward looking in his long-range thinking. If our industry would spend a comparable amount for research that industry in general does, it would mean that the gas industry would have to increase its support of research one hundred fold.

This is impossible for the regulated gas utility industry, and I doubt whether our industry as a whole can be now convinced that it should substantially increase its financial support. I believe that underground storage and its further development is urgent at this time, but I doubt that integrated pipelines would help materially since they are practically all loaded at peaks with little interchange between them possible.

Limited-Area Study

I wonder if Mr. Hess' ideas of a broad range study could bring an answer to the fundamental question through an expenditure of, as he says, "a few hundred thousand dollars." I rather believe that a study of a limited area, say, the Pittsburgh-Cleveland area, would be much more to the point and securing the cooperating efforts of experts from our industry, the Bureau of Mines and engineering experts in gas production, chemistry, coal mining, the oil industry, etc. This would, of course, require financial support by the coal and oil industries as well as of a section of the gas industry. Some of this work is now underway, but not coordinated.

I would therefore recommend that consideration be given to keeping Mr. Hess' idea before us as a long-range program, and if possible concentrate on a research study as regards a limited area of the country.

. . . . . .

The only outright opposition to the plan is expressed by another company president, who asks that his name not be used.

"I read the article before I looked to see what Mr. Hess' relation to the gas industry was, and was not surprised to find that he is identified with the appliance manufacturers group.

His prayer for uniformity of gas content is understandable, but I cannot join in the petition—being an executive of a company which has been in existence for more than 65 years as a producer and supplier of straight natural gas.

Mr. Hess has not looked into and of course does not understand the innumerable and extensive problems which would be involved to properties such as ours should uniformity of content be achieved.

. . . . . .

The remaining five opinions were brief and, for the most part, in the same vein. E. H. Eacker, president of Boston Consolidated Gas Co., thought the suggestions "merit careful consideration." E. F. Putnam, president, Greenwich (Conn.) Gas Co., thought the subject should be "developed further to determine if more intensive analysis and study proves it to be as necessary over the long range as it appears from superficial reading."

R. H. Knowlton, president, Connecticut Light & Power Co., Hartford, expressed doubt as to the economic feasibility because of the large investment, but "would favor . . . a pilot study by AGA of a reasonably small section of the country . . ."

R. L. Fletcher, president of Providence (R. I.) Gas Co., thinks that "if the industry believes a consideration of its objectives and merits is warranted, it should be referred to AGA."

H. J. Patterson, president, Lowell (Mass.) Gas Co., feels "that it might not be too early to inaugurate a study of the proposition that pipelines might eventually tie in with equipment located at coal mines. (I have) felt, for a long time, that this is a logical development when the supply of natural gas falls below the demand that is going to be built up in the future."

Gas Keeps in Step With Demands Of Modern Products and Processes

By JACK HUEBLER
Surface Combustion Corp., Toledo

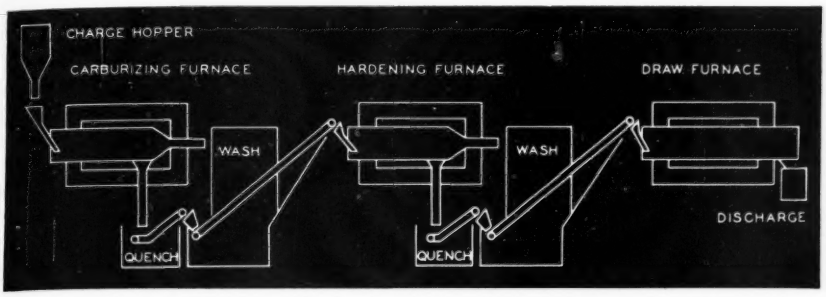


Fig. 1. Schematic drawing of integrated heat treat line. The system is continuous and fully automatic.

THROUGH its research and development facilities, the gas industry is endeavoring to keep gas utilization in step with modern product and process demands. The activities discussed in this paper have been selected to illustrate each of what I consider the important phases of industrial research and development.

For my present purpose, I shall divide the broad terms "research" and "development" into three distinct phases; basic studies, equipment and process improvement, and equipment and process development. Basic studies are concerned with the detailed chemical and physical properties and behaviorisms of the substances with which we deal. Through a study of these basic properties the knowledge required to improve or develop processes and equipment is acquired.

The second phase is constituted by activities designed to improve existing processes and equipment. Through these activities equipment is simplified, made cheaper and more reliable, processes are refined and fuel utilization improved, resulting in the production of better and cheaper products.

The third phase, the development of new processes and equipment, is by far the most glamorous activity, although it should not necessarily be considered the most important. It is here that fundamental research culminates in new methods and equipment which replace outmoded methods or result in the opening of new fields of gas utilization. Immediately following the installation of the new process or equipment, the work of improvement is begun.

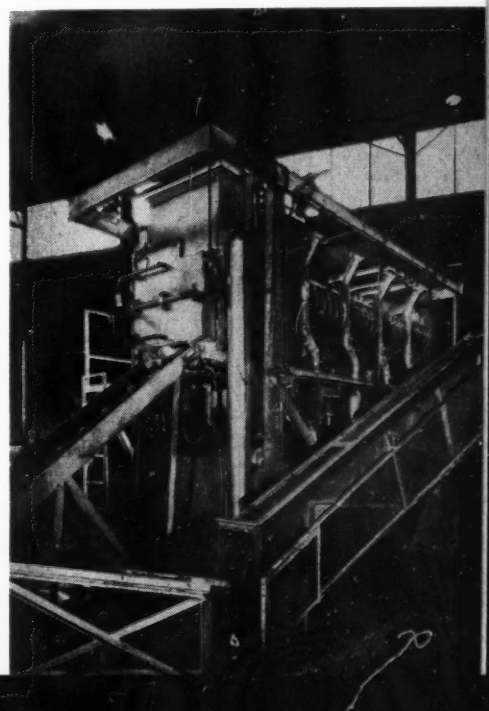
The American Gas Assn. through its facilities, is largely concerned with basic studies. It sponsors projects resulting in basic knowledge which is applicable to the industry as a whole. This work, which is directed to the particular problems of the gas industry, augments to a considerable extent research work done in universities and by government agencies, such as the Bureau of Mines and the Bureau of Standards. Equipment manufacturers do only a small amount of basic work, being almost totally concerned with the interpretation of such knowledge into operable equipment and processes through development work.

A change of great significance appears to be occurring within the gas industry. Modern industrial processes and products are demanding greatly refined methods of applying heat and of controlling or causing physical and chemical changes in the material being processed. To meet these demands the gas industry is taking unto itself technicians highly skilled in the basic sciences. Advanced techniques of physics, physical chemistry, chemistry, metallurgy, mathematics, and mechanics are of necessity being applied to the solution of our problems. This trend will be noted, I am sure, in the few examples of research and development to be presented.

I should like to mention briefly a few of the fundamental research projects now or recently under way. Among the projects sponsored by AGA are researches into catalysts for reforming and forming of hydrocarbons with particular emphasis upon resistance to sulphur poisoning; studies of the combustion fundamentals of simple gases and their mixtures, with emphasis upon flame lifting and flashback limits; basic studies of combustion to find reasons for combustion velocity limitations through detailed examination of the conditions obtaining at the inception of detonation; and a comparative study of the effects of case hardening by induction and flame heating.

In industry, instrument manufacturers are working on improved mass spectrographs for gas analysis. Modern practice is making it necessary to measure gas compositions far beyond the scope of our old friend, the orsat. Existing spectrographic equipment is of great aid but has its shortcomings. The present equipment, besides being expensive, tends to dissociate the more complex molecules in the gas sample and render interpretation of the results difficult. Techniques which will potentially remove this difficulty and which will also make the instrument cheaper and more operable are being investigated. In a completely different field

Fig. 2. Automatic handling of billets for forging through high speed heating furnace.



Presented at the annual AGA convention in St. Louis, Oct. 15-17. Mr. Huebler is research engineer for Surface Combustion.

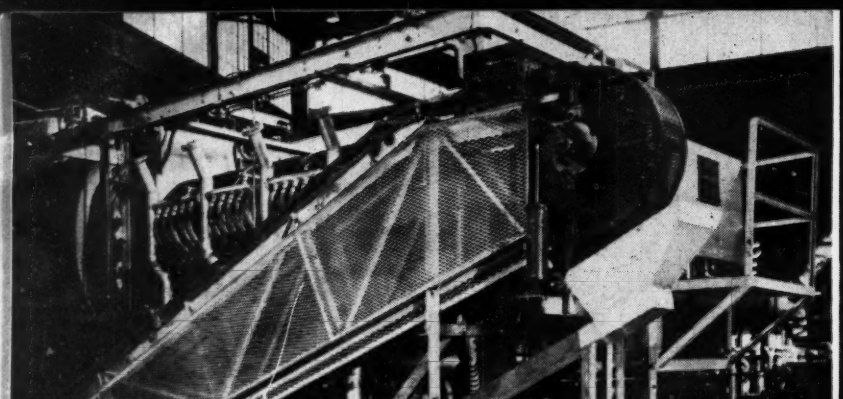


Fig. 3. Another view of press forging installation shown in Fig. 2. Heating operation is time-controlled. One operator can load and unload furnace.

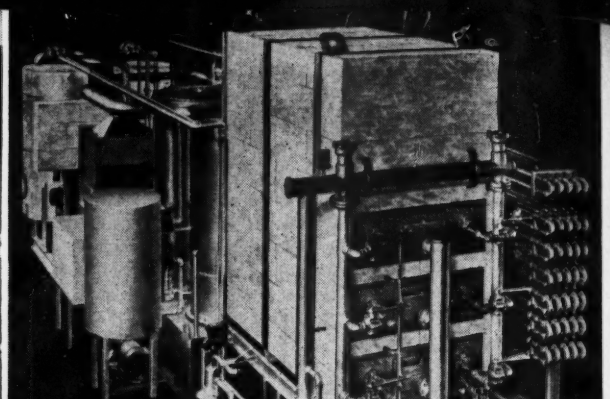


Fig. 4. Hydrogen-nitrogen atmosphere generator is nearly self-operating, costs slightly more than a flue gas generator.

there is work being initiated to study the microscopic and submicroscopic effects of the various commercial annealing atmospheres on the surface of metals.

Universities and governmental agencies, through their research facilities, are making available a great store of fundamental information. For example, the Bureau of Mines has recently completed the calculation and indexing of the equilibrium composition of mixtures of gases formed from carbon, hydrogen, oxygen, and nitrogen in any proportions and over a very wide range of temperature and pressure.

These results are accurate and easily obtainable. General availability of information of this nature will make it unnecessary in the future for each individual to conduct extensive calculations. To facilitate individual calculations of equilibrium and thermal effects the Bureau of Standards is compiling the most recent and reliable thermodynamic data concerning all of the elements and compounds for which the data are available.

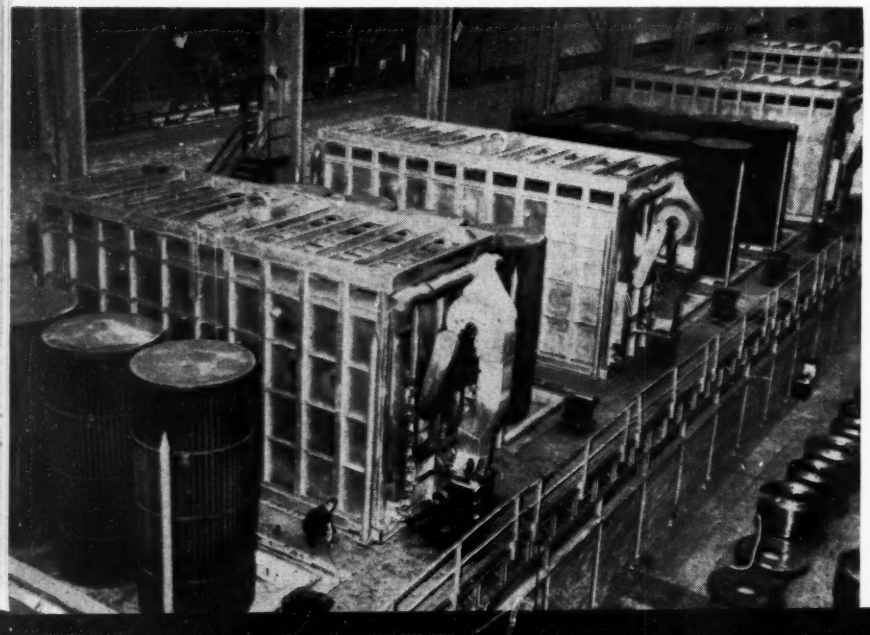
Basic studies of the type mentioned, and of course many others, strengthen our fundamental knowledge and provide the "tools" required to improve and extend the gas industry.

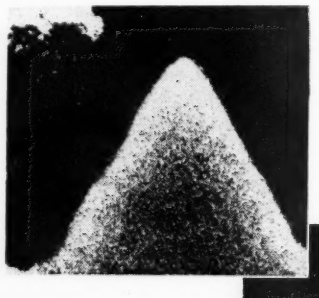
One of the most important development trends at the present time is toward fully automatic, mechanical handling of work to and from industrial furnaces. Of course, the continuous furnace with its mechanical conveyors has long since moved the parts through the furnace. In most cases the work has been manually charged and discharged. Work is now being done to have the charging and discharging done mechanically and in synchronism with prior or later operations.

This trend is partially illustrated in the schematic drawing in *Fig. 1*. This drawing shows how material to be carburized, quenched, reheated, hardened, and drawn is moved continuously by means of fully automatic equipment. The work is fed from a storage hopper into a screw type conveying carburizing muffle. The parts issuing from the carburizing furnace fall into an oil quench tank and onto a belt type conveyor. The belt conveyor removes the parts from the oil, transfers them to a second belt which carries them through a washer and into the hardening furnace. The conveying system through the hardening furnace, quench, wash and delivery to the draw furnace is a repetition of the previous system. The draw furnace is also of the screw type. Thus the system is continuous and fully automatic.

An additional example of integrated mechanics handling is the press forging installation shown in *Figs. 2* and *3*. The sequence of operation is as follows. One of the press operators places a cold billet on a chain conveyor which, after a transfer, carries the billet up to the elevated furnace. The billets are then cross pushed into position to be pushed through the furnace. After the billet has been pushed through the furnace and heated to forging temperature it slides by gravity down a chute to the press operator. On the trip down the chute the hot billet collides with a series of baffles. The resulting impacts effectively remove the scale. One of the press operators is therefore enabled to load and unload the furnace as well as to feed the heated billet into the first die of the

Fig. 5. Modern bell annealing cover installation.





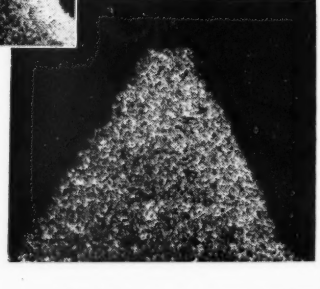


Fig. 6. Rolled thread of steel bolt before and after controlled carbon restoration.

press from a single position.

The furnace referred to above is of special interest in itself since it is of the high speed heating type. In the conventional furnace the work is heated to the desired temperature by holding the furnace at that temperature. The work is kept in the furnace for a period of time long enough to insure thermal equilibrium between the work and the furnace. This may be said to be a temperature-controlled heating operation.

In contrast, the high speed heating furnace operates with the furnace temperature several hundred degrees higher than the desired work temperature. The desired work temperature is obtained by controlled periods of exposure of the work to the heat in the furnace. Thus it is a time-controlled heating operation. The heating time is consequently many times less in the high speed heating furnace than in the conventional furnace. As a result, the high speed heating furnace requires less floor space and—of great importance—forms only a very thin scale layer compared to a conventional furnace when heating steel.

In connection with billet heating for press forging some actual production figures comparing gas-fired rapid heating equipment, induction heaters, and the conventional oil-fired slot forge may be of interest. In one forge shop the same forging operation has been carried out using all three types of furnaces for accurate comparison.

It was found that total operating costs at the time were approximately \$25, \$31, and \$59 per ton of forgings for high speed gas, induction, and conventional oil respectively. The principal factor contributing to the relatively high operating cost for the conventional oil furnace lies in die replacement cost. Die life has been shown to be a function of the amount of scale on the billet going into the press. As already pointed out, high speed heating with either gas or induction forms little scale compared to conventional heating and consequently gives very materially improved die life.

Comparing the high speed gas and the induction furnaces it is found that the \$6 edge in favor of gas is made up of \$3 for fuel cost, \$1 for maintenance, and \$2 for extra investment and depreciation charges stemming from the higher initial cost of the induction installation.

Two recent developments in the prepared atmosphere field should prove of interest. These are the development of a commercial hydrogen-nitrogen generator to furnish an atmosphere of superior properties and an installation for continuous carbon restoration during cycle annealing of mild carbon steel.

The development of the hydrogen-nitrogen generator *(Fig. 4)* was largely precipitated by the fact that electrolytic tin plating of steel strips has laregly supplanted hot-dipping tinning. One of the advantages of electrolytic tinning has been to reduce the amount of tin used to cover the steel surface. However, with this advantage a special problem became important. The steel strip, prior to tinning, is cold reduced, cleaned of oils, bright annealed, and very lightly pickled.

At the time the electrolytic lines were being installed in quantity most of the annealing was being carried out in bell type furnaces and in an atmosphere formed by the rich combustion of natural gas and air with subsequent dehydration. A typical example of this gas analysis is 5% CO_2, 10% CO, 12% H_2, plus 40°F dew point and the balance nitrogen. An unsatisfactory condition of the resulting tin plate was found, however. A band at the edges of the strip could be seen and the tin plate showed serious lack of corrosion resistance.

It was soon found that if the above annealing atmosphere were replaced by nitrogen gas, the edge band could be largely eliminated and the corrosion resistance improved. Since it is not commercially feasible to generate or use pure nitrogen for annealing, a generator producing an atmosphere containing 2% CO, 2% H_2, and 96% N_2 was developed. Although the use of this atmosphere gave improved results it was apparent that further improvement was still required.

An adaptation of the nitrogen generator was then made wherein, by inserting a catalytic reaction step, an atmosphere containing substantially only hydrogen and nitrogen could be produced. The application of this atmosphere to the annealing operation subsequently proved to give greatly improved results. It may be seen that the generator amounts to a small chemical plant. However, since it is important to manufacturers that they need give this equipment a minimum of attention, the unit is nearly self-operating and in addition produces atmosphere at a cost only slightly in excess of the cost of the previously used flue gas generator.

Concurrently with this atmosphere development, great improvements were made in the annealing furnaces to both increase production and permit the atmosphere to perform to best advantage. *Fig. 5* shows a modern bell annealing installation.

A few years ago the processes of carbon control and carbon restoration were introduced into the heat treat industries. Prior to this time the endothermic cracked gas generator was perfected to furnish an atmosphere consisting of 20% CO, 40% H_2, 40% N_2, and small amounts of water vapor, CO_2, and CH_4. This atmosphere had been used for some time as a carrier for methane in carburizing.

In fact, this generator was largely responsible for making gas carburizing a commercial success. A study of fundamental thermodynamics later showed how to manipulate the dew point of the above atmosphere gas so that the gas could be adjusted to be in equilibrium with any desired carbon content of steel within the austenite range. From this groundwork, furnace know-how rapidly developed the fundamentals into commercial practice.

As an illustration, *Fig. 6* shows equal photomicrographs of a hot rolled 35 carbon steel bolt before and after controlled carbon restoration. Before carbon restoration the bolt shows heavy decarburization caused by hot rolling in air of the original bar stock and of the thread rolling operation. In this condition the bolt is of little use because of the soft surface. Metallurgically it is desirable to replace the surface carbon to exactly the 35 carbon content of the original bar stock. This can now be done by heating the bolt in endothermically cracked atmosphere with the dew point controlled so that the gas will carburize to exactly 35 carbon. The result is shown at the right in *Fig. 6*.

In processes such as the above illustration, the parts are heated to from 1550°F to 1700°F for a period of time only long enough to restore the carbon. Since the parts must be heated for quenching in order to harden, the carbon restoration step adds little or no cost to the required hardening steps. In another field, such as the manufacture of mild carbon bar stock. the stock must be annealed. The annealing operation requires a long, relatively low temperature cycle. For this type of operation, technical reasons make the use of undiluted but controlled endothermically cracked atmosphere difficult.

However, it has been proved that a mixture of endothermically cracked gas and nitrogen gas can be controlled to produce the required atmosphere. With this atmosphere it is possible to not only prevent surface decarburization, but to accurately restore carbon where decarburization has already occurred, even during the long, low temperature annealing cycles required.

In summary, I should like to point out that the research and development projects discussed above (and they are typical) depend for their success to a large degree upon detailed application of fundamental knowledge. Continued growth of the gas industry may well depend upon bringing to bear upon our problems sound basic analysis as furnished by highly skilled technicians.

NEWS

Regulation

Three Major Projects Get Priorities Aid for Pipe

Line pipe priorities assistance for the first quarter of 1952 has been given three major natural gas pipeline projects, as well as 361 smaller projects, DPA has announced.

The major projects include extension of the existing Gulf Coast-Buffalo line of Tennessee Gas Transmission Corp. to the New York-Massachusetts line, and the 826-mile line of Texas Eastern Transmission Corp. from Koskiusko, Miss. to Connellsville, Pa. Both of these lines will supply gas to the critical Appalachian region and areas northward.

The other major project includes 1108 miles of lines for United Gas Pipe Line Co. from the Gulf coast to Kosciusko, Miss. and Monroe, La., making available approximately 1 billion cu ft of gas per day to pipelines stretching into the east and middle west.

Wimberly Takes FPC Post

Commissioner Harrington Wimberly of Oklahoma, a member of the Federal Power Commission since Oct. 5, 1945, has been elected vice chairman of the commission for the calendar year 1952, an office he previously held during 1948 and part of 1947. He succeeds Thomas C. Buchanan.

A graduate of the University of Oklahoma, Mr. Wimberly was formerly associated with the Altus (Okla.) *Daily Times-Democrat* as editor, publisher, and owner; with Oklahoma Newspapers Inc. as general manager; and he has been a director of the Southern Newspaper Publishers Assn. and the Oklahoma Press Assn., as well as president of the latter group.

Supreme Court Upholds Virginia Anti-Strike Law

In upholding the Virginia law that prohibits public utility strikes, the U. S. Supreme Court has reversed recent decisions striking down similar laws in Michigan and Wisconsin.

The Virginia statute makes unlawful any strike against a public utility unless certain requirements are fulfilled by both parties, including two mediation conferences, followed by a governor's request for arbitration. If either side refuses arbitration, the governor must be given five-week notice of work stoppage, with the state having authority to seize the utility if a strike occurs and to invoke criminal and civil penalties for any interference with operation of the utility by the state.

The current case arose over last summer's strike threat over operation of a ferry across Chesapeake bay, at which time Governor Battle of Virginia invoked the anti-strike law resulting in a union fine of $7500. The union president and secretary also received fines, as well as jail sentences, with this judgment upheld by the Supreme Court.

Government Threatens To Take Over Scrap Drive

A national emergency is imminent unless drastic action is taken concerning inadequate handling of the scrap situation. Speaking at a recent joint meeting of the iron and steel scrap industry and consumers advisory committees, Defense Production Administrator Manly Fleischmann stated, "Scrap shipments are down 30 to 50% below what they were a month ago . . . It is the joint responsibility of government and private industry to see that this scrap is available. If private efforts fail, the government will take on the job and it will not be comfortable at all."

Briefly, the scrap situation is as follows. As of Dec. 30, 1950 there were 3,716,000 tons of scrap in 165 large mills, with the tonnage reduced to 2,783,000 tons by Oct. 30, 1951. At the end of May 1951, scrap inventories in dealers' yards totaled 804,000 tons, while October inventories in the same yards stood at only 665,000 tons. In January 1951 overall scrap inventories at mills averaged 1.6 months supply with inventories down to 1.3 months supply in October 1951.

Area Pricing Considered At Washington Meeting

At a late November meeting in Washington, representatives of the natural gas industry and Office of Price Stabilization officials considered a proposal on the use of area pricing in establishing ceilings at the wellhead for dry gas in new fields. A majority of industry men present agreed to the feasibility of such a plan, stating that transportation and development costs make it impractical to develop and market available gas in some areas, and that this factor should be weighed in setting ceilings for new gas if supplies are to be increased.

Although no formal recommendations were made, it was proposed that north and south Louisiana, east Texas, the Gulf Coast, and south Mississippi be considered as a single area for studying prices on new gas and that the Permian Basin in west Texas be considered as a separate area.

O. D. Judd, chief of the petroleum branch, stated that OPS would approach the problem of pricing new gas at the dry gas level and consider residual gas as a separate factor at a later date.

Howard Replaces Kells

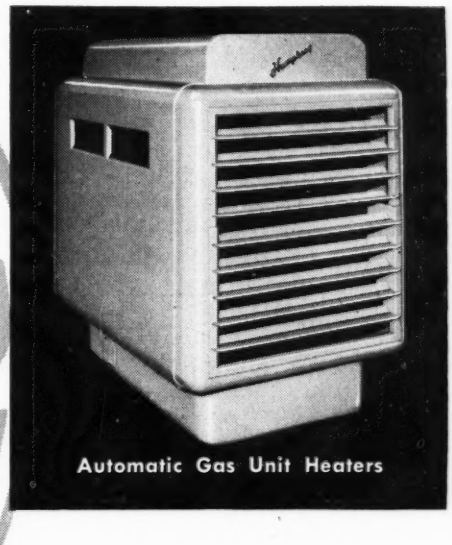
Otis Howard is new director of the National Production Authority's engine and turbine division, whose basic responsibility is distribution of allotments of steel, copper and aluminum under the Controlled Materials Plan.

Mr. Howard succeeds Charles Kells, recently returned to his position as assistant to the president of West Penn Electric Co.,

Brooklyn (N. Y.) Borough Gas Co., serving half a million residents, has been commended by the New York Department of Health for its comprehensive safety program. No fatalities attributable to faulty gas appliances have occurred in the area serviced by the company.

Shown above on a tour of inspection are Dr. John F. Mahoney, commissioner of health; Jerome Trichter, the assistant commissioner who has been directing the campaign to reduce deaths from gas in Manhattan; Walter M. Jeffords Jr., Brooklyn Borough president; and Philip B. Baas, manager of customers service. The tour was conducted to show the procedure being used in converting.

The safety program includes a new two-way radio system to patrol the district at all times; 48 servicemen and five supervisors, most of them with an A+ rating, which means at least seven years' experience servicing gas appliances; 24-hour coverage by servicemen and supervisors; and careful checking of installation of new gas refrigerators.



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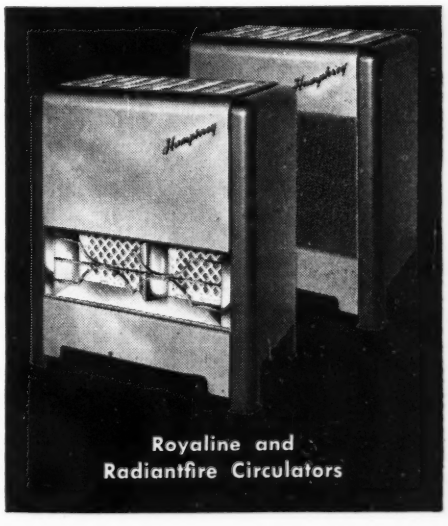

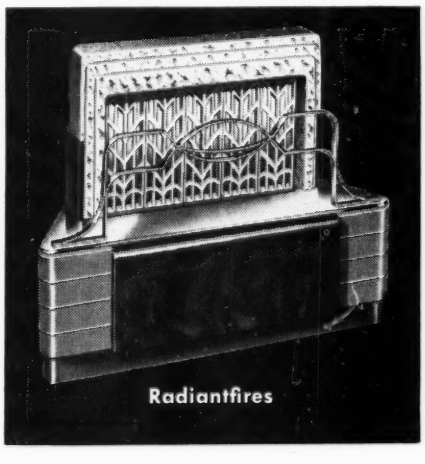

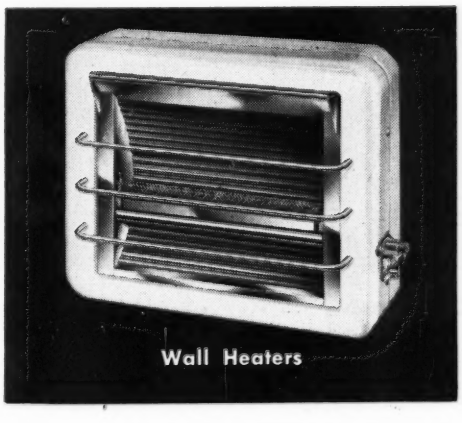

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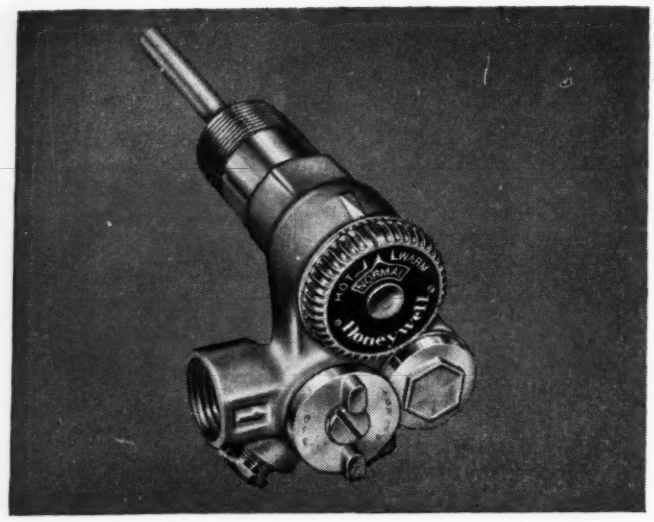
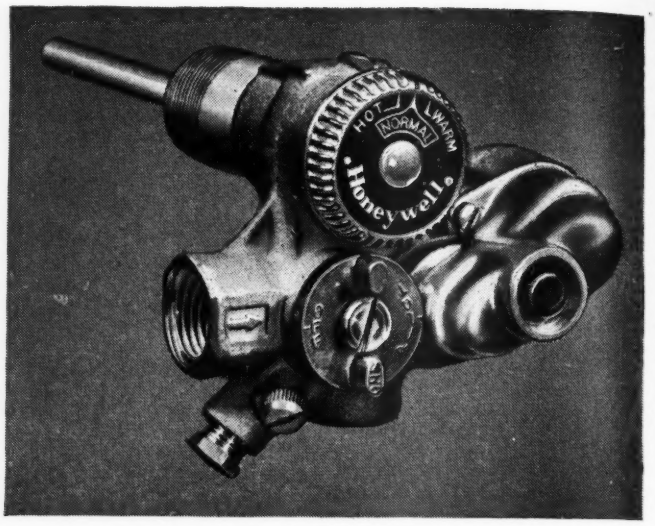
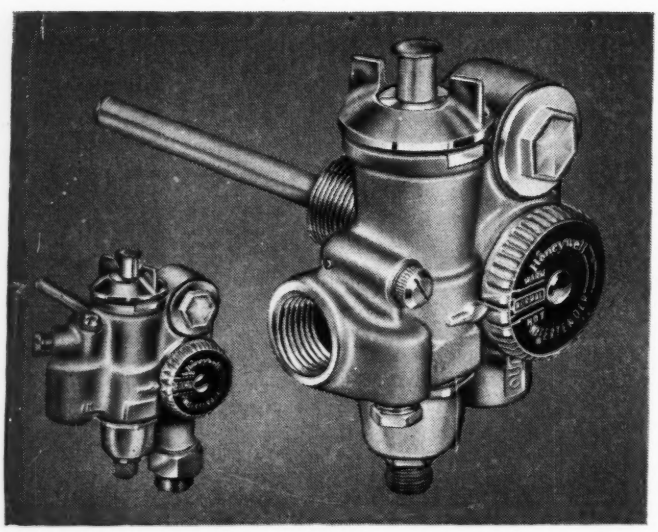


The "9"—Model V-5109 is a dependable member of Honeywell's complete line of gas water heater controls and is recommended for use with natural or manufactured gas. This thermostatic gas valve incorporates a snap-action thermostat, a main gas cock, a pilot position valve and a main burner pressure adjustment in one sturdy unit. Compactly designed for easy adjustment and service. Ruggedly constructed to give years of satisfactory performance.

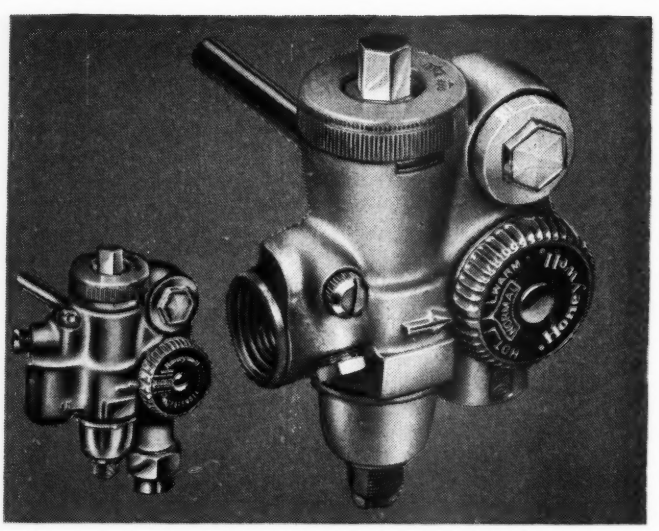


The "19"—Model V-5119 is a fine thermostatic gas valve that can be used for natural or manufactured gas. (Not suitable for LP gas). It is sturdily built and is carefully adjusted to give long, satisfactory service. Its compact design incorporates the following: snap-action thermostat; main gas cock; pilot position valve with an integral pilot adjusting screw; main burner pressure adjustment; safe lighting thermomagnetic pilot.

Now - From Honeywell -



The "5"—Model V-5105 (above, right) is one of Honeywell's finest gas water heater controls. It may be used for natural, manufactured or LP gas. It ideally combines, in one easy-to-service unit, the main gas cock with pilot position valve, pilot adjustment screw, flow regulating valve, thermostat and thermomagnetic pilot that features 100% shut-off and safe lighting. *Model V-5115* (left, above) functions like V-5105, except it's compactly designed for use as a concealed water heater control.



The "20"—Model V-5120 (above, right) is Honeywell's newest control! Provides *complete 100% control* for natural, manufactured or LP gas, yet it's priced lower than the "5" or the "15." It's ideally designed to include the main gas cock, pilot position valve, main burner pressure adjustment and a thermomagnetic pilot with 100% shut-off, all in one compact unit. *Model V-5121* (left, above) functions exactly like Model V-5120 except it is designed to take up minimum space for use as a concealed water heater control.

Here's good news for you!

- **Easy to service—a model for every gas**
- **Precision-built to give years of trouble-free service**
- **Thoroughly tested under the most rugged conditions**

A Complete Line Of Gas Water Heater Controls

With the availability of this complete Honeywell line, you now can have a dependable Honeywell control on *any* water heater using natural, manufactured or LP gas! And for long, trouble-free performance, you know there's no better guarantee than the name *Honeywell!*

You'll find water heaters with Honeywell controls are easier to sell because prospects know Honeywell means the *best* in controls—thus giving you an *extra feature* to talk about!

You'll benefit *after* the sale, too, for the simple, compact design of Honeywell Controls makes them easier to adjust! And if *precision manufacturing* and *exhaustive factory testing* can help reduce service requests, you're sure to get *fewer calls* from customers with Honeywell-equipped models! That's why it's smart to *insist on Honeywell controls* on the gas water heaters you sell!

Mail the coupon below and get all the sales facts about Honeywell controls. Then you'll be able to take full advantage of the added sales features they give you!

MINNEAPOLIS **Honeywell**

H HONEYWELL

First in Controls

Minneapolis-Honeywell Regulator Co.
Appliance Controls Division
8775 Mettler Street, Dept. GS-1-18
Los Angeles 3, California

Please send me detailed information on your complete line of gas water heater controls.

Name _____

Address _____

City _____ *Zone* ____ *State* _____

PORTLAND (Ore.) Gas & Coke Co. recently joined the Associated Restaurants of Oregon in sponsoring a five-day waitress training school. It was conducted by John B. O'Meara, nationally famous restaurant consultant, shown above during a "right and wrong way" demonstration. The Portland utility periodically co-sponsors such programs as a goodwill measure.

New York, under NPA's rotation policy which permits key men from industry to leave their companies for six-month tours of duty with the government to assist in the mobilization program.

Regulatory Newsnotes

Contending that the facilities will not be used in the transportation or sale of natural gas in interstate commerce subject to FPC jurisdiction, the commission has granted New York State Public Service Commission's request for a rehearing and oral argument on FPC's order authorizing Brooklyn (N.Y.) Union Gas Co. to construct a 3700-ft pipeline in Brooklyn to supply natural gas to the Williamsburg power plant of the New York city board of transportation.

Secretary of the Interior Oscar Chapman recently confirmed the appointment of Robert L. Foree of Dallas as director of the PAD, effective Jan. 1, replacing Richard G. Lawton, Arkansas independent, who has served as PAD production director since the post was created soon after the Korean outbreak. To accept the appointment, Mr. Foree will resign as president of Texas Independent Producers & Royalty Owners Assn., a post he has held since March 1950.

The Defense Production Administration recently established the Office of Aluminum, naming Samuel W. Anderson, program vice chairman of the War Production Board during World War II, as deputy administrator for aluminum. In his new capacity, Mr. Anderson is charged with assuring a supply of aluminum to meet defense and essential civilian requirements.

Gas FIRED
Peerless HEATING EQUIPMENT
THE COMPLETE LINE FOR ALL Gas NEEDS
Forced Air and Gravity Circulators, Radiant Heaters, Panel Heaters and Fan Type Unit Heaters. 68 Years of progressive advancement has developed this complete, tried and proved line—styles, types and sizes for domestic, commercial or defense heating requirements.
A.G.A. Approved
Stylewise, Qualitywise and Pricewise The PEERLESS Line Is Best for Every Heating Requirement — For Small Homes, Apartments, Housing Projects, Defense Housing, Churches, Schools, Motor Courts, Stores, Offices, Shops.
Write for literature and prices today.
YEAR 'ROUND DISPLAYS
PEERLESS MANUFACTURING CORP., —— LOUISVILLE 10, KENTUCKY

Financial

SoCal Seeks $10 Million Emergency Rate Increase

Last month's top event on the rate scene was Southern California Gas Co.'s request for an immediate emergency rate increase of about $10 million. The interim hike was suggested at the opening of hearings in Los Angeles on the company's general rate boost which, if granted, would add $16.6 million annually to the firm's revenues.

F. M. Banks, SoCal president, stated that the requested increase would average less than 20% for general service customers and that a householder will still be able to do his cooking, water heating, refrigeration, and space heating with natural gas for about $5 a month on a year-round average.

Four other applications for increases have been presented to state commissions, and two have been approved. The Arizona Corporation Commission granted an electric and gas rate boost of 12½% to Central Arizona Light & Power Co. on Dec. 1. In Missouri, the public service commission on Nov. 23 approved a hike requested by Missouri Natural Gas Co., Farmington. It was deemed necessary to offset a 26% increase on gas from Missouri Natural's supplier, Mississippi River Fuel Corp. Washington (D.C.) Gas Light Co. cites a 40% increase in the price of its gas as the reason for asking a 15% rate hike. The firm told the District commission that its return will fall below 4% in 1952 unless higher rates are authorized.

The Oklahoma Corporation Commission has under consideration an application of Oklahoma Natural Gas Co., Tulsa, for a $6.9 million annual increase to bring its net return up to 7%. The firm contended at recent hearings that its present annual revenue falls about $3,253,000 short of this mark.

During late November and early December, the Federal Power Commission:

1. Suspended Transcontinental Gas Pipe Line Corp.'s wholesale rate increase which would amount to $13.9 million annually, deferred its use until May 1, and consolidated an investigation of the firm's rate schedules with the suspension proceeding, both of which will be heard beginning Jan. 28.

2. Allowed Roanoke (Va.) Pipe Line Co.'s new schedule to take effect Dec. 1, thereby reducing by $10,500 per year the rates charged under the interim tariff which had been in effect since August 1950.

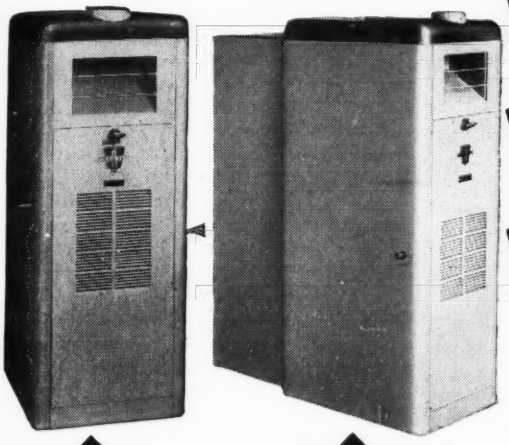
3. Denied motions of three companies to advance dates on which suspended rate in-

SECURITY

MODEL SFA AUTOMATIC GAS-FIRED

HI-LO COMBINATION

Now...The TWO-IN-ONE Furnace

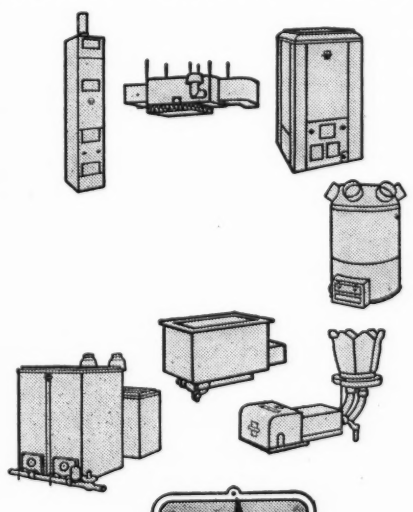


FOR CLOSET INSTALLATION

FOR BASEMENT INSTALLATION

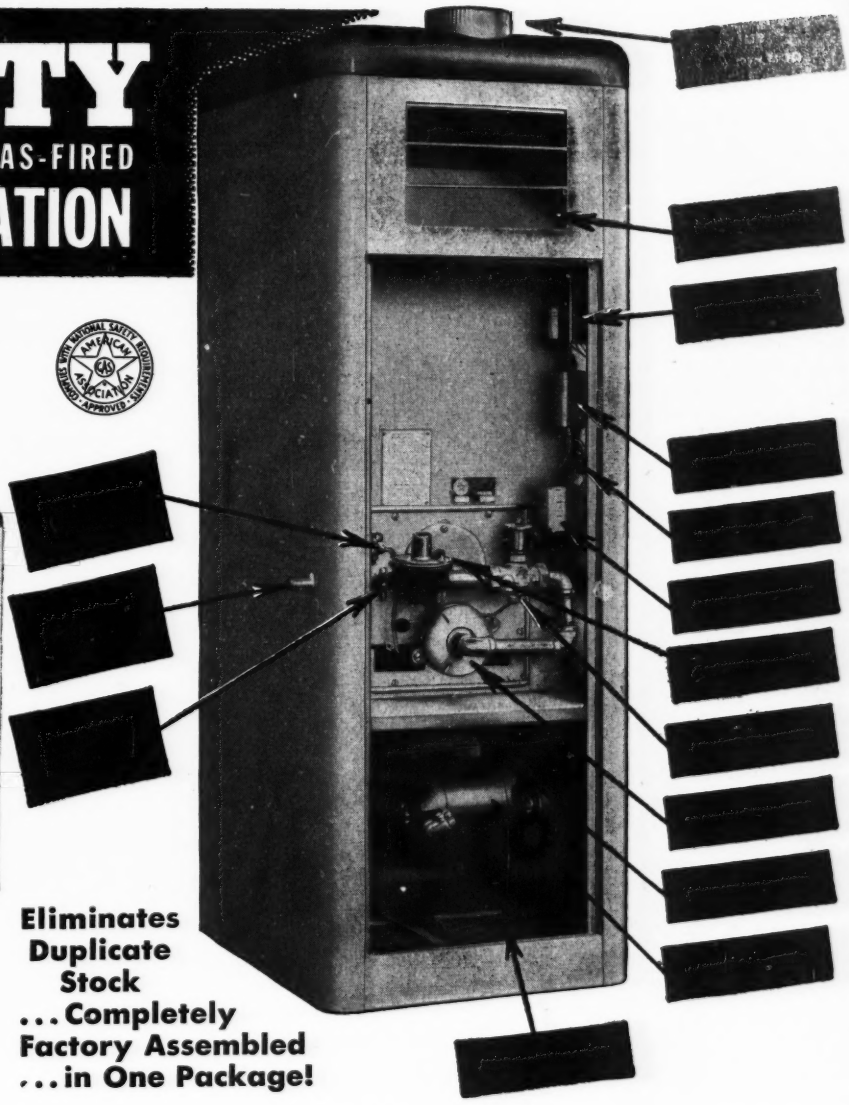
INPUT

4 SIZES — 62,500 BTU - 80,000 BTU
100,000 BTU - 125,000 BTU - 160,000 BTU



SECURITY

The LONG-LIFE Line



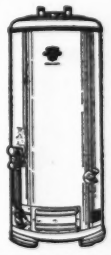
Eliminates Duplicate Stock ...Completely Factory Assembled ...in One Package!

Yes, sir . . . TWO-IN-ONE because only standard Security SFA Furnaces need be kept in stock. Factory-assembled and wired to serve in closet-type or usual basement-type installations. Return air duct connector for basement application is shipped knocked down . . . can be attached to the back or to either side in a matter of minutes.

Simple to Service . . . Easy Access

All controls are located in one compartment. Quick, accurate adjustments . . . easy replacements are expedited without disturbing other wiring. Built-in filter racks can be placed at installer's option.

Built of top-quality materials throughout. Complete information, specifications, prices and discounts available. Write today!



Builders of the famed Security Heavy Duty Water Heaters!

SECURITY MANUFACTURING CO.

1630 Oakland Ave. **Kansas City 3, Mo.**

creases may become effective under bond. United Fuel Gas Co., Charleston, W. Va., sought to have the suspension period on its proposal expire on the same date as that of its supplier, Tennessee Gas Transmission Co., Houston. In turn, Ohio Fuel Gas Co., Columbus, and Central Kentucky Natural Gas Co., Charleston, asked to have their suspension periods coincide with United Fuel's, their supplier, if its motion was granted.

Amounts involved and suspension expiration dates are, for TGT—$7 million, Dec. 16; United Fuel—$9.7 million, Feb. 6; Ohio Fuel—$2,474,000, Feb. 10; Central Kentucky—$2.9 million, Feb. 17.

4. Received a staff recommendation that $11,414,696 of the $18 million increase proposed by Tennessee Gas Transmission Co. be approved. The adjustment was to go into effect on Dec. 16 on an interim basis, under bond. The commission, TGT, and all intervenors agreed to the arrangement.

5. Postponed indefinitely a Nov. 27 hearing on the investigation of rates charged by Canadian River Gas Co. and Colorado Interstate Gas Co., both of Colorado Springs.

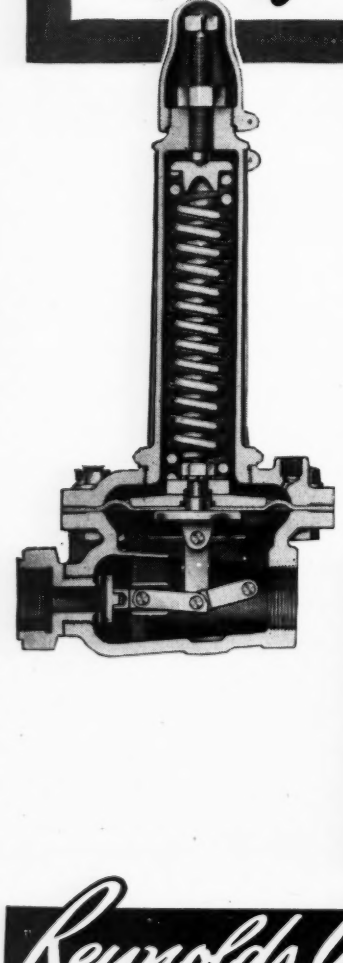
6. Accepted for filing three proposed increases in wholesale natural gas service. Kentucky West Virginia Gas Co., Pittsburgh, would pass its $1,139,000 on to Louisville (Ky.) Gas & Electric Co. and Pittsburgh (Pa.) & West Virginia Gas Co.; Cumberland County Gas Co., Millville, N. J. and Jersey Central Power & Light Co., Asbury Park, would pay $97,000, or 28%, more for gas from South Jersey Gas Co., Atlantic City; and United Gas Pipe Line Co., Shreveport, wants to up rates to Southern Natural Gas Co., Birmingham, by 89%, or $1.3 million annually.

7. Allowed a proposed $2.4 million annual increase by Natural Gas Pipeline Co. of America, Chicago, to go into effect Dec. 1 upon posting of a $250,000 bond. The revision, suspended by the commission last May, was made effective pursuant to a motion filed by the company.

IN THE HIGH PRESSURE FIELD

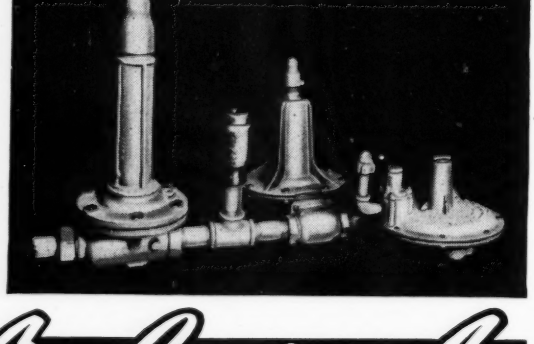
THERE IS SAFETY

IN *Reynolds* ...



Accurate, Safe Control

of tremendous pressures is an ever present problem in the gas field. Reynolds field Regulator illustrated at left is one of the many high pressure regulators built by Reynolds. It is thoroughly tested and proved in service. It handles up to 1,000 pounds safely reducing same to pounds. For more than fifty-five years Reynolds has designed and built gas regulators. Safety, accurate performance, years of service—these are some of the built-in factors responsible for Reynolds enviable position in the Gas Control Field.



Reynolds Gas Regulator Co.

ANDERSON, INDIANA, U. S. A.

GAS CONTROL SINCE 1892

Manufacturers

Los Angeles Plastic Firm Reorganized, Refinanced

A group of industrialists has reorganized and refinanced Golden Bear Manufacturing Co., Los Angeles, manufacturer of plastic pipe. New officers and stockholders include Robert S. Howard, chairman of the board; Richard G. Kress, president; Robert C. Raab, executive vice president; and Richard C. Bergen, secretary and general counsel.

The company is producing lucite and tenite plastic tubing for underground gas mains and farm irrigation, as well as custom plastic tubing, rod, and pipe. Plastic packaging film and electrical insulating tubing are soon to be added to the line.

A new 22,000-sq ft building was expected to be ready for Golden Bear's plant and offices by Jan. 1.

Detroit Brass Expands

To better serve its west coast customers, Detroit (Mich.) Brass & Malleable Works will open a new Los Angeles warehouse in mid-January. R. L. O'Brien, president, reports that the structure will provide more than 15,000 sq ft of floor area, nearly tripling the firm's Los Angeles space.

The one-story, concrete building will have truck-high doors and car loading docks.

Resident company officials in charge will be W. A. Longobardi, Pacific coast manager, and A. A. Jacquot, western district sales engineer. Territory to be served includes California, Washington, Oregon, Nevada, New Mexico, Arizona, and Texas as far east as El Paso.

Servel Names Distributors

Two new distributors have been named by Servel Inc., Evansville, Ind. In the state of Rhode Island, as well as Cape Cod and its nearby islands, Tracy & Co. Inc., Providence, will handle Servel products. The firm has six men in its gas appliance sales division.

Gladco Distributors Inc., Buffalo, will cover six counties in western New York. Carlton G. Luhman is president, general manager, and sales manager of the company.

Controls Division Moved

About 100 employees have moved into a new 15,000-sq ft plant on the property of General Controls Co. in Glendale, Calif. The structure was built to house the recently

established Grayson-Greenamyer appliance controls division, formerly located in Monrovia.

George Greenamyer, who served as works manager at Monrovia, is manager of the new division, and Richard Grayson has been appointed head of the entire appliance controls division. John Grayson is director of research and development of Grayson-Greenamyer and is based at a new research laboratory in Monrovia.

Blaw-Knox Gets Contract For Pittsburgh Pilot Plant

Pittsburgh Consolidated Coal Co.'s research and development division has awarded to the chemical plants division of Blaw-Knox Co., Pittsburgh, a contract for the construction of a large pilot plant.

To be built at the coal company's research center at Library, Pa., the pilot plant will be used for the partial conversion of coal, employing a newly developed low temperature carbonization process. The process has been proved, according to the company, by more than 200,000 man-hours of research and months-long operation of a smaller plant.

Operation of the plant is expected to provide answers to two problems: (1) Cost and design data for a commercial plant, and (2) production of sufficient quantities of liquids to permit commercial evaluation of the many chemicals and special carbons obtained by the process.

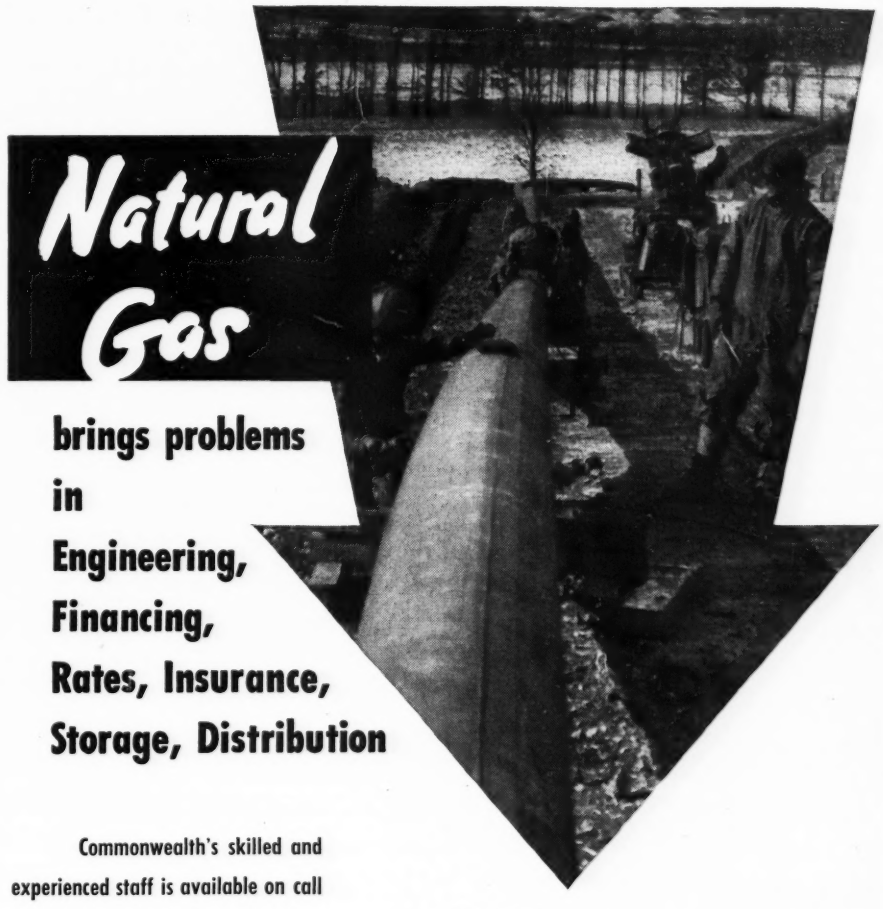
Research

Environment Laboratory Inaugurated in Cleveland

On Nov. 1 and 2 the American Society of Heating & Ventilating Engineers inaugurated its new Environment Laboratory in Cleveland. In addition to the laboratory, built for the study of human comfort in heated and cooled indoor spaces and the development of needed data for the design and installation of panel heating and cooling systems, those attending inspected the partially completed rooms which will be used for an intensive study of odors, the U. S. Navy calorimeter which was nearly completed, and numerous exhibits about research projects currently under way.

Cloud Wampler, president, Carrier Corp., Syracuse, told 140 executives who attended a luncheon on Nov. 1 that more than 1.6 million American homes will have partial or complete air conditioning within the next five years. He urged that more money be devoted to fundamental research of value to the entire industry and said that ASHVE's new facilities are a challenge.

Some problems to be explored by the Environment Laboratory in the immediate future include: (1) Radiation and convection exchange between large surfaces at varying temperatures. (2) Influence of radiation on comfort chart data. (3) Influence of changes in distribution of panel surface temperatures on the efficiency of panel heating systems. (4) Influence of changes in distribution of panel surface temperatures on comfort.



brings problems in Engineering, Financing, Rates, Insurance, Storage, Distribution

Commonwealth's skilled and experienced staff is available on call to assist you in these and other phases of your gas operations. Over a period of many years we have supplied successful and satisfactory services to manufactured, L-P and natural gas companies ranging in size from only a few meters to hundreds of thousands. Services covering such problems as:

Design of facilities
Property acquisition reports
Engineering reports on new projects
Gas manufacturing consultation
Cost of service and rate studies
Studies of technical, rate and other problems related to mixed gas supply
Preparation of testimony and representation before local and federal regulatory agencies
Underground storage field studies
Emergency, standby and peak-shaving supply studies
Distribution layout or revamping to meet growing loads
Space heating saturation problems
Market surveys
Insurance requirements
Depreciation studies
Assistance with financings
Metering problems
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Jackson, Michigan *Washington, D.C.*

IGT Plans Publication of 16 Research Bulletins

Publication of its research bulletin series, suspended since 1948, has been resumed by the Institute of Gas Technology, Chicago. Accomplishments of the intervening three years of basic and applied research are being presented in a series of 16 bulletins.

Two of them—"Sulfur Poisoning of Nickle Catalysts" by C. H. Riesz, H. A. Dirksen, and W. J. Kirkpatrick, and "Expansion Behavior of Coal During Carbonization" by O. P. Brysch and W. E. Ball—have already been published. "Pilot Plant Catalytic Gasification of Hydrocarbons" by C. H. Riesz, P. C. Lurie, C. L. Tsaros, and E. S. Pettyjohn is in the hands of the printers. Prices for these three are $2.50, $5, and $3.50, respectively.

Miscellany

AGA Plumber-Dealer Water Heater Campaign Set

To capitalize on the water heater market available through plumber-dealers, AGA will sponsor a February-March industry-wide promotional campaign based on the theme, "Ask Your Plumber-Dealer."

A consumer guessing contest, to be featured in special window displays, is to be the foundation of the campaign. Entry blanks, which will contain the contestant's name and address and information about his present water heating equipment, including its age, will provide prospect lists.

Display materials and supplementary kits for utilities and plumber-dealers are available from AGA. One of the smaller easel cards, emphasizing quantities of hot water required for various household tasks, is illustrated.

Biggest Utility Conversion Planned by Brooklyn Union

A conversion project twice as extensive as any previous utility changeover has been scheduled by Brooklyn Union Gas Co. for March 6 to Oct. 1, 1952. The firm has applied to the New York Public Service Commission for authority to switch 900,000 gas users to straight natural.

President Hugh Cuthrell estimates that the project will cost about $21 million. Some 2 million appliances will be adjusted by a special crew of 3000 employees.

Brooklyn Union's volume of gas sales,

TWO IN EVERY KITCHEN

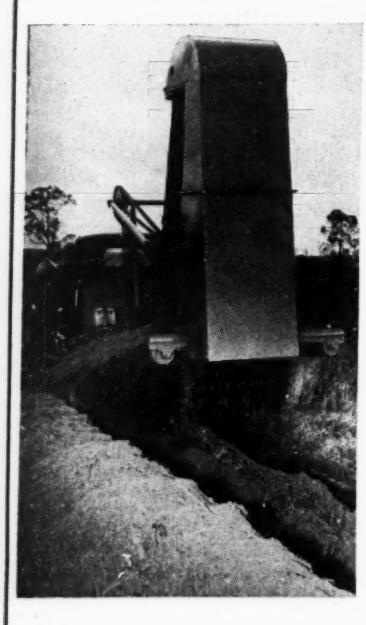
Making the two-refrigerator household as familiar as the two-car garage is W. Paul Jones' recommendation to the nation's refrigeration manufacturers who are finding their market nearing saturation.

Speaking at a company sales meeting in Evansville, Ind. in late November, the Servel president said, "More than 40 million of the 45 million families in this country already have automatic refrigeration, so that one year's normal production—about 5 million units—would use up the new-owner potential." Mr. Jones added that a virtually untapped field exists in families who find one refrigerator inadequate for their increasing food storage needs.

Stretching refrigerator size from 6 to 8 or 9 cu ft hasn't been enough to keep pace with increased use of frozen and fresh foods and the trend toward home entertainment spurred by television, Mr. Jones stated.

PEWTHERS' "EARTHRIPPER"

OPENS THE EARTH LIKE A ZIPPER!



ECONOMICAL... Pewther's EARTHRIPPER saves money three ways! It costs less—it's speedy operation saves labor costs . . . and standardization of automotive parts cuts down maintenance costs. Construction engineers who use the Pewthers' EARTHRIPPER have found that it costs only 4c a foot to operate. This low cost covers initial investment, depreciation, operation, maintenance, and labor over a three-year period! With an EARTHRIPPER, one man can handle your ditching problems, from driving the machine to the ditch site to lowering the boom and opening the earth at a maximum rate of twenty feet a minute! Because all gears run in oil, the EARTHRIPPER can be used for years with few replacements of parts. If you want to save time and money, invest in an EARTHRIPPER today.

MOBILE... The EARTHRIPPER is versatile because it is mobile. On the highway its speed is the speed of the truck. The raised boom clears telephone wires and tree branches, making transit easy and speedy, even in heavy city traffic. The EARTHRIPPER digs vertical ditches in any kind of terrain under almost any digging conditions. On slopes the frame levels. While the tires follow the contour of the earth, the ditcher digs a vertical ditch! If you need a ditcher for large or small ditching jobs, the EARTHRIPPER can solve your problems.

EFFICIENT... For straight, clean ditching, the answer is Pewther's EARTHRIPPER. This new, unique ditcher offers a complete different design. It is the first ditcher to be built into a truck. Bucket design saves time because there is no loss of time in cleaning. Bottom of each bucket forms the top of the preceding one. The buckets separate as they go over the top sprocket, throwing the dirt onto the conveyor belt. Conveyor belts throw the dirt on either side of the ditch and can be reversed on a moment's notice. In competition the EARTHRIPPER digs straight ditches with clean sides . . . in record time.

Pewther's "EARTHRIPPER" is the only ditcher built into a truck. This means *one man* can handle your ditching job, from driving the machine to the ditch site to opening the earth to a maximum depth of five feet. The EARTHRIPPER is particularly suited for gas lines, extensions and house-to-street service lines. Utility ditching requiring ditches 10", 14", or 18" wide are duck soup to this new, *different* Pewthers' ditcher.

Send for the folder on the new Pewther's ditcher, the EARTHRIPPER. Learn for yourself how the EARTHRIPPER can save time and money on any small ditching job! Ask for a demonstration before purchase . . . at any point in the United States!

I want the new folder on the Pewther's "EARTHRIPPER."

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

I saw this ad in the above magazine.

PEWTHERS DITCHER COMPANY

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which has increased 48% during the last decade, will climb another 40% in the next three years, and the firm's 30,000 house-heating customers will double during the same period, Mr. Cuthrell predicted.

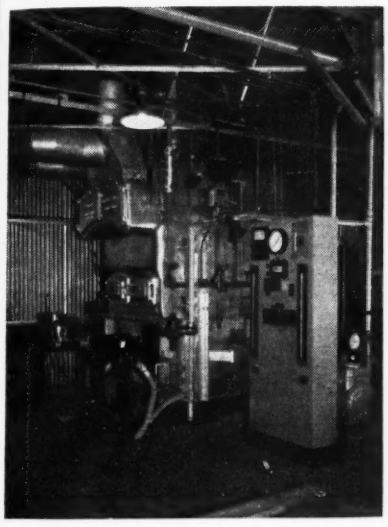
To finance the conversion program, Brooklyn Union will take $3 million from retained earnings and borrow $18 million from four banks.

ConEd Finds "Dangerous Situation" in Tenement

When a Consolidated Edison Co. maintenance man was called to a New York tenement by complaints of low pressure last month, he disconnected the apartment from the gas main because of what a ConEd official described as a "dangerous situation" caused by clogged pipes.

Members of 31 Puerto Rican families, who had been crowded into 21 apartments with only gas stoves for heat, were relocated in warmer flats by the New York City Housing Authority, which had obtained title to the tenement last April. The move was made after 70 tenants protested to the city bureau.

The tenants, including 71 children, are ordinarily without heat and hot water in the six-story building formerly owned by Dorothy and Pearl Bloom. The Bloom sisters collected $500 each from tenants when the building was reopened four years ago, presumably to pay for a heating system which was never installed. They were later fined for multiple-dwelling violations and sentenced to prison for rent gouging.



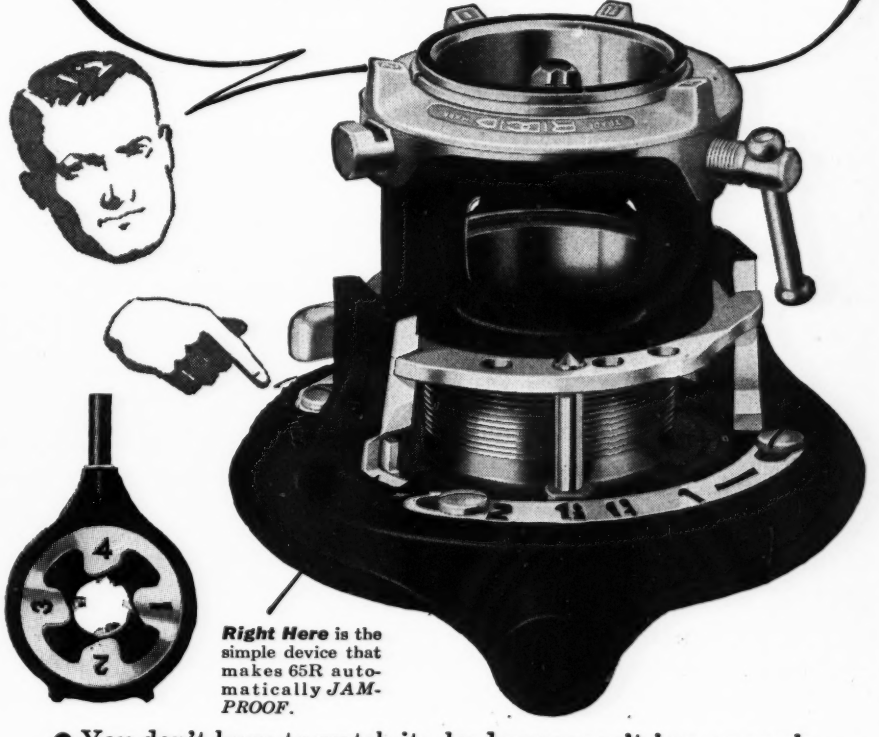
Operating characteristics and efficiency of fuel-burning and automatic control equipment with inputs to 5 million Btu/hr may be determined in this expanded laboratory recently completed by Webster Engineering Co. of Tulsa, Okla.

Devoted to fact-finding, the installation includes a steel firebox boiler with a combustion chamber which may be adjusted to duplicate specific dimensions, and an arrangement allowing selection of natural or induced draft to reproduce a desired set of conditions.

The project was undertaken to improve the company's research and development of its line of combustion and control equipment.

You can't jam the new RIDGID 65R

Really streamlined pipe threading with this RIDGID self-contained die stock



Right Here is the simple device that makes 65R automatically *JAM-PROOF.*

● You don't have to watch it—lead screw can't jam on workholder. New jam-proof drive plate automatically kicks out driving ratchet pawl when standard length thread is cut. Your recent model 65R easily converted—just buy new drive plate, put in place of old plate. Perfect threads on 1″ to 2″ pipe with one set of 4 high-speed steel dies—sets to pipe size in 10 seconds, mistake-proof self-centering workholder sets instantly! Buy the new jam-proof RIDGID 65R at your Supply House.

RIDGID

★ Work-Saver Pipe Tools ★

Plastic Services Installed By Southern Counties

With copper increasingly difficult to obtain because of the defense effort, Southern Counties Gas Co., Los Angeles, began installing plastic tubing in its system on Nov. 24. Eventually, the company plans to use plastic for replacement of services throughout its system.

In replacing an old service, the plastic pipe is inserted into the original steel pipe in much the same manner as copper was. Compression-type couplings are used to connect the main to the piping on the customer's premises. The plastic sections are joined by fusion, using butyl acetate.

Formerly, service replacements required either inserting copper tubing or completely replacing the service with new steel pipe. The new method will conserve both metals. In addition, plastic tubing is less expensive, light and easy to handle, non-corrosive, and durable.

$200 Million Budget Set

Public Service Electric & Gas Co., Newark, has upped its construction budget for the years 1951-53 to $200 million. This three-year program will boost post-war expansion expenditures to $379 million. Early last year, the total for 1951-54 had been set at $100 million, $55 million of it to have been spent in 1951.

Included among the firm's projects are additions and improvements to gas plant facilities necessitated by the introduction of natural gas, additions to generating capacity amounting to 475,000 kw, and expansion of electric transmission, distribution, and substation properties.

API Receives APRA Award

One of the coveted awards of the American Public Relations Assn. has been received by the American Petroleum Institute for its outstanding work in promoting better public understanding of the oil industry.

API's oil industry information committee, which plans and operates the institute's program, accepted the APRA certificate of public relations achievement at the association's recent seventh annual convention held in Philadelphia.

The citation lauded the committee's program for its "astute understanding and skill" in pinpointing the oil industry's role in the nation's economy.

Miscellaneous

Reorganization of the firm's sales department has been announced by L. A. Dixon, vice president of Rockwell Manufacturing Co., Pittsburgh. Effective Jan. 1, five regional managers took over: eastern—M. J. Harper, New York; central—P. C. Kreuch, Pittsburgh; southern—J. W. Northcutt, Atlanta; midwestern—C. K. Madison, Houston; and western—H. Boezinger, Los Angeles. Rockwell will continue to maintain district offices in major cities.

Eight awards were heaped on *Gas News* and *Gas News Pictorial,* employee publications of Southern California Gas Co., Los Angeles, in the annual editorial competition of the Southern California Industrial Editors Assn. Included in the three first prizes and five seconds was a second place award honoring *Gas News Pictorial* for overall excellence.

Maryland's public service commission early last month ordered Cumberland & Allegheny Gas Co. to make natural gas available for househeating in its western Maryland territory. Although a gas field in Garrett county is being developed, the commission found that the company had 43 deferred applications for space heating in homes, municipal buildings, and churches.

MidSouth Gas Co. received a certificate of achievement at the annual Ebasco safety awards ceremony held Dec. 3 at New York's Hotel Roosevelt. Companies which achieve an injury index 25% below the national average for their respective industries are honored. The injury index is a composite of the frequency and severity of accidents.

The Chemical Plants Division of Blaw-Knox Co., Pittsburgh, has been licensed by the Houdry Process Corp. to use certain of the latter firm's processes, designs for equipment, and technical information relating to catalytic treatment of petroleum and other hydrocarbons.

ARCCO
ARCCO NEVER-DRY PEN
Writes for Months
REPLACES OTHER MAKES • USES REGULAR INKS
Regardless of pulsations or other causes of ink failures this new Never-Dry Pen will make clean and complete records. Ink supply lasts for several months without refilling reservoir. Capillary tube from ink bottle placed in instrument case feeds pen with continuous flow. Closed system sealed from atmosphere prevents clogging and dirt accumulation.
Weight of pen is constant at all times thus insuring extreme accuracy. No slopping or dripping. Stainless steel construction—no corrosion. When ordering, specify make and type of recording instrument.
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ASSOCIATIONS

Pacific Coast Gas Assn. Announces 1952 Plans

The Pacific Coast Gas Assn. enters its 59th year fully organized and with a full program.

The accounting section, led by R. F. Ogborn, Southern California Gas Co., had its opening series of conferences in San Francisco on Nov. 1 and 2. At this meeting four separate conferences were held: "Building Design and Maintenance," "Priorities and Material Controls," "Customer Activities," and "Tax Accounting." On April 17 and 18 a second series of four subjects will be covered at a meeting in Los Angeles: "Tabulating Equipment Utilization," "Unit Costs and Manpower Standards," "Right-of-Way and Land," and "Centralization vs. Decentralization."

In addition to the conference program, there are two special committees, one studying the proposed NARUC classification of accounts for gas utilities and the other procedures for the preservation of records.

All accounting section meetings are held jointly with the Pacific Coast Electrical Assn.

The sales and advertising section is headed by F. N. Seitz, Southern Counties Gas Co., with R. D. MacMahon, Southern California Gas Co., sponsoring domestic sales activities, and D. C. Ellswood, Southern Counties Gas Co., commercial and industrial activities.

The domestic group has plans well advanced for Pacific coast participation in the annual Spring Style Show of gas ranges, and is studying the feasibility of a promotion on water heaters, laundry dryers, and an upgrading effort on heating appliances. Plans will be announced at two meetings, one in Los Angeles on Feb. 27 and 28 and another for northern members in San Francisco on March 4 and 5. Following these meetings

CALENDAR

1952 PCGA Meetings

Feb. 27-28—Domestic Sales Conference, Los Angeles.

March 4-5—Domestic Sales Conference, San Francisco.

March 5-6 — Technical Services Conference, Fresno.

April 2-3 — Technical Section Transmission Conference, Berkeley.

April 15-17 — Technical Section Joint Customers Service & Distribution Conference, Los Angeles.

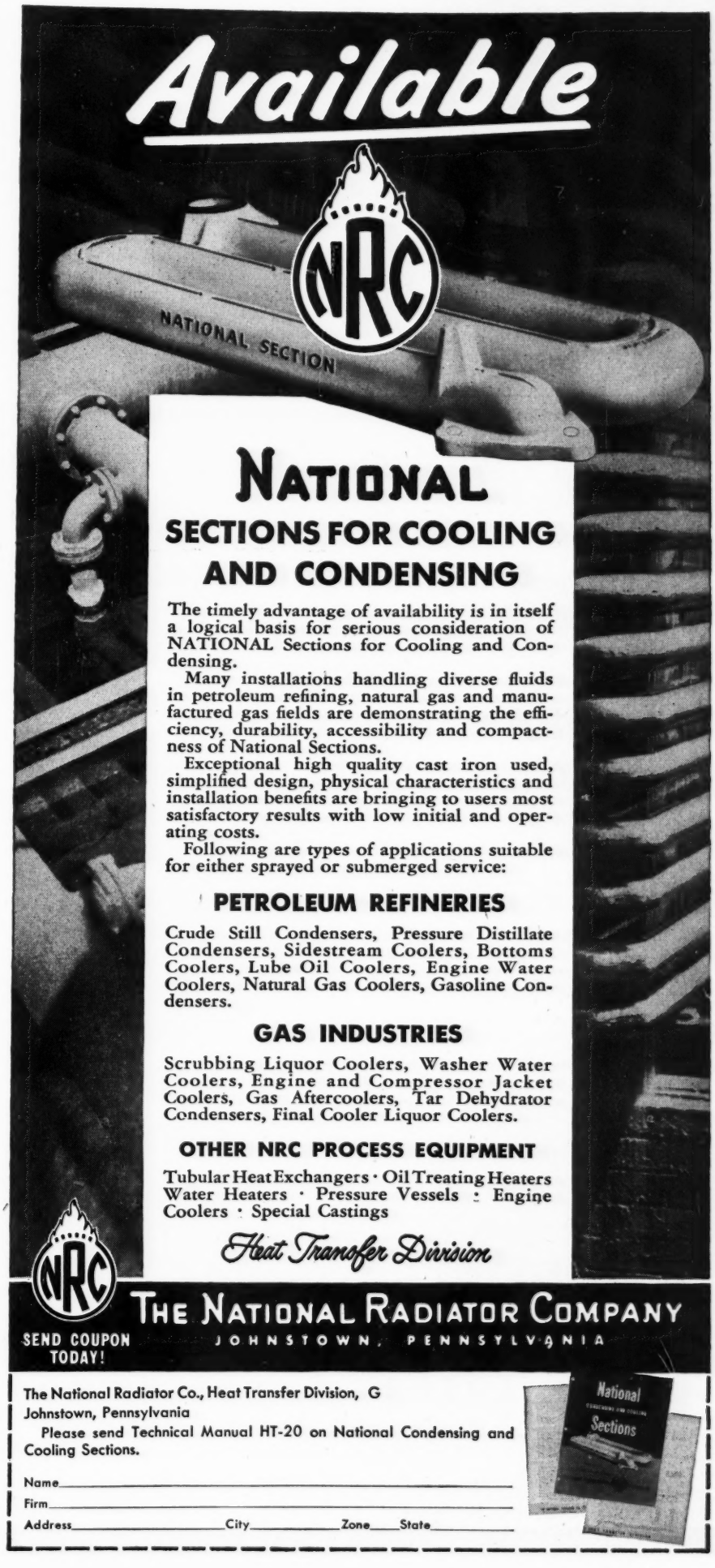
April 17-18 — Four Accounting Section Conferences, Los Angeles. Subjects are Utilization of Tabulating Equipment; Unit Costs and Manpower Standards; Right of Way and Land; and Centralization vs. Decentralization.

April 22-23—Home Service Workshop, Seattle.

May 6—Sales & Advertising and Manufacturers Sections Joint Round Table on All Domestic Appliances, Los Angeles.

May 27-28 — Commercial & Industrial Sales Conference, Los Angeles.

June 10—Commercial & Industrial Sales Conference, Portland.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NATIONAL SECTION
NATIONAL
SECTIONS FOR COOLING AND CONDENSING
The timely advantage of availability is in itself a logical basis for serious consideration of NATIONAL Sections for Cooling and Condensing.
Many installations handling diverse fluids in petroleum refining, natural gas and manufactured gas fields are demonstrating the efficiency, durability, accessibility and compactness of National Sections.
Exceptional high quality cast iron used, simplified design, physical characteristics and installation benefits are bringing to users most satisfactory results with low initial and operating costs.
Following are types of applications suitable for either sprayed or submerged service:
PETROLEUM REFINERIES
Crude Still Condensers, Pressure Distillate Condensers, Sidestream Coolers, Bottoms Coolers, Lube Oil Coolers, Engine Water Coolers, Natural Gas Coolers, Gasoline Condensers.
GAS INDUSTRIES
Scrubbing Liquor Coolers, Washer Water Coolers, Engine and Compressor Jacket Coolers, Gas Aftercoolers, Tar Dehydrator Condensers, Final Cooler Liquor Coolers.
OTHER NRC PROCESS EQUIPMENT
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the promotion committee will begin planning for the 1952 Old Stove Roundup. The annual home service workshop will be held in Seattle April 22 and 23, with Anne Whipple, Seattle Gas Co., as its chairman.

A round table on all domestic appliances will be held in Los Angeles on May 6 to review the present development of automatic features for the benefit of home economics editors. The manufacturers section will participate in this round table.

In the meantime a special committee is working on a revision of the *Data Book on Gas Fuel*, a manual for architects and builders last published by the association in 1939.

The commercial and industrial group is writing the first chapters of a manual on commercial and industrial applications of gas, which it hopes in time to build into a comprehensive reference work. Meetings will be held in Los Angeles on May 27 and 28 and in Portland on June 10.

The technical section, under the leadership of J. R. Rensch, Coast Counties Gas & Electric Co., is planning three conferences dealing with operating and engineering problems. The first—March 5 and 6 in Fresno—will deal with technical services including corrosion, odorization, etc. The second—April 2 and 3 in Berkeley—will cover transmission pipelines and large volume measurement. The third—April 15-17 in Los Angeles—will comprise two 3-session meetings, the first covering customers service and the second distribution.

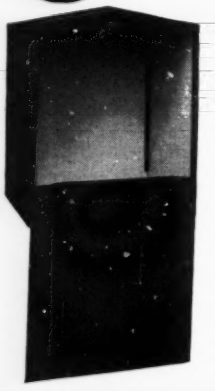
A special committee of the transmission group expects to complete this year its code of safe practice for making repairs to high pressure pipelines.

The manufacturers section, headed by T. T. Arden, Robertshaw-Fulton Controls Co., holds very frequent meetings of its several product divisions. Foremost among present problems is material procurement, followed closely by interpretation of government regulations. All product divisions are working side by side with utility men on promotion matters through the various product councils set up in the sales and advertising section.

President W. M. Jacobs has announced that the 1952 annual meeting will be held at the Ambassador hotel, Los Angeles, Sept. 3, 4, and 5.

Protect Your Meter Investment with a **METER HOUSE**

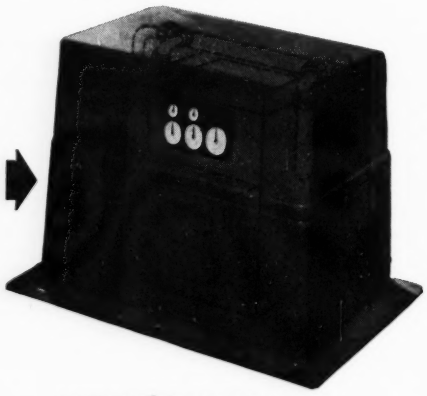
INDUSTRIAL METER HOUSE



for orifice meters, recording, thermometers, D P cells, etc. Steel construction, insulated against weather. Baked auto enamel finish.

Size: width 21", depth 15", height 26".

ZENALOY METER HOUSE



A protective and decorative cover for residential installations made of molded Fiberglass construction. Impervious to all weather and soil conditions. Will not rust or warp. Light, strong and easy to install.

Size: width 27", depth 18½", height 22".

"TILTBACK" ORIFICE METER HOUSE

for all types of orifice meter installations, convenient for making repairs or calibrating meters. Fabricated from 22 gauge sheet metal. Weight approximately 50 lbs. Easily assembled.

Size: width 26", depth 16", height 32".

(Special houses made to your specifications)

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Information concerning Insulating Bushings & Nipples, Plastic Tubing, Commercial Type "CN" Orifice Fittings, Leveling Saddle, Bored & Calibrated Meter Runs and Straightening Vanes, sent on request.

This Month

Flora G. Dowler to Head Home Service Workshop

Successful home service activities, know-how experiences, and sales promotion ideas will be featured at the three-day meeting of the AGA Home Service Workshop to be held at the Drake Hotel, Chicago, Jan. 21-23. Heading activities of the workshop will be Flora G. Dowler of Manufacturers Light & Heat Co., Pittsburgh, chairman of the AGA home service committee.

After a "Get Acquainted Coffee Hour," Miss Dowler will open the first session with a talk on "Spotlight on Home Service." This event will be followed by a symposium on "Home Service Literature" by Lolita Harper, Cincinnati Gas & Electric Co.; "Home Service and the Dietitian" by Dorothy Pearson, East Ohio Gas Co., Cleveland; and "Teachers Institutes" by Gladys B. Price, Southern California Gas Co., Los Angeles.

At Monday's conference luncheon, F. X. Mettenet, vice president of Peoples Gas Light & Coke Co., will welcome the delegates to Chicago after which Mary I. Barber, food consultant with the office of the quartermaster general, Battle Creek, will talk on "The Home Economist in the News—Cook Books and Civil Defense." Eight discussion groups will meet in the afternoon.

Peoples Gas will play host to the delegates on Tuesday, with meetings in its home service auditorium and a conducted tour of company kitchens and home planning and display departments. Also on schedule are a school demonstration, "Sparkle Plenty," by Dorothy Longmore of Manufacturers'; a refrigerator demonstration by Julia Hunter, Lone Star Gas Co., Dallas; a panel discussion on "Training for Home Service"; a review of controls and ignitions on modern gas ranges by H. W. Geyer of Robertshaw-Fulton Controls Co., Los Angeles; and a talk on "Reaching Today's Homemakers" by Ruth Gaffney of *Today's Woman.*

Two AGA films, "Heart of the Home" and "Johnny Takes a Journey," will be presented Wednesday morning, as well as a skit on laundry promotions by Margaret Doughty of Bendix and Susan A. Mack of Boston Consolidated Gas Co. At a symposium, "Here and There With Home Service," work done by Consumers Gas Co., Ontario, on "Classes for the Blind" will be described by Marjorie Chandler and a hot water puppet show, "Out of the Ordinary," will be pre-

sented by Mary Huck and Pauline Wheeler of Ohio Fuel Gas, Columbus.

Guest speaker at the Wednesday luncheon, George F. Mitchell, AGA and Peoples Gas president, will review the new records of the gas industry for 1951. Other scheduled presentations include "Investors Relations Luncheon" by Catherine Haigler, Brooklyn Union Gas Co., and a forecast for home service in 1952 by W. J. Schmidt, Long Island Lighting Co., new AGA residential gas section chairman.

Air-Gas Ratio Analyzer Work Nears Completion

Development of an instrument for determining the ratio of air and gas in a mixture of the two, such as employed in contemporary gas burners, is currently being completed by the AGA Laboratories as part of the gas production research committee's program to help utilities meet peak load problems when other gases are interchanged with base load gases.

The instrument will be used to determine what burner adjustment under base load conditions would satisfactorily meet peak load conditions without readjustment. Next step in the program is to build a limited number of the instruments for trial use in the laboratories of cooperating utilities.

Employing the thermal conductivity principle, the analyzer receives a sample of 100% gas which is then compared with a second sample of the air-gas mixture being used for a given air shutter setting. The resulting gas-air mixture is determined from the instrument reading.

ASHVE Annual Meeting Set For St. Louis, Jan. 28-30

When the American Society of Heating & Ventilating Engineers convenes for its 58th annual meeting in St. Louis, Jan. 28-30, a symposium on the control of industrial atmospheres and 12 papers in the fields of air cleaning and distribution, warm air heating, building heat loss and gain, and physiological research will be of top interest.

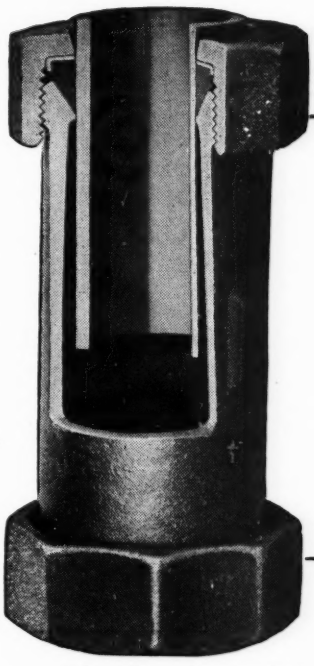
Headquarters for the convention, which is expected to draw about 1000 members, will be the Statler and Jefferson hotels.

W. N. Witheridge, General Motors Corp., will act as moderator of the symposium. Other highlights of the meeting will be presentation of the society's F. Paul Anderson medal for notable scientific achievement in the heating, ventilating, and air conditioning field, and installation of 1952 officers.

Reports

AGA Requirements Group Rules on Ignition Systems

Clarification of the distinction between automatic and manual lighting of ovens was one of the big jobs tackled by the AGA requirements subcommittee on ranges when this group, as well as the subcommittees on water heaters and gas piping and appliance installation, met at the Cleveland Laboratories in November to consider revision of existing requirements.

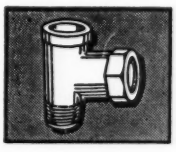


NORMAC
Couplings, Sleeves and Fittings

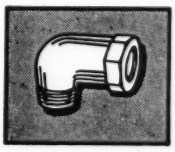
for maximum deflection, ease of "stabbing," complete confinement of the rubber!

So close are "Normac" rubbers confined at the gasket tip that possibility of flow is reduced almost to "nil." These couplings, sleeves and fittings . . . approved by gas utility men across the country for their time-saving features, ease of handling and dependable service . . . are available in a complete range of sizes. Made from air furnace malleable iron they provide greater wall thickness than pipe on which used.

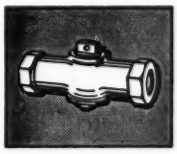
NORMAC COUPLINGS are made with 5" centers in all sizes. NORMAC SLEEVES are identical in design except that they are identical in design except that they are made with 10" centers. Nuts and gaskets are interchangeable.



Compression-End Service "Tee"—First fitting of this type ever produced with full coupling depth and special threads on male end to prevent dropping into old hand taps when used to replace standard threaded fittings.



Compression-End Service "Ell" — Extra depth makes it possible to "stab" pipe into stops and without measuring, pull back a safe distance to allow ultimate deflection eliminating possibility of strain against tap in main.



Compression-End Iron Body Brass Core Service Stopcocks—End the necessity of threading on the job plus the elimination of the threads themselves—combining all the advantages of NORMAC COUPLINGS and the best in stopcock design. 2½" coupling depth on each end.

Normac Brass Fittings Developed in 1939 for Use with Copper Tubing—Our complete line of brass fittings can be used either on new installations or where copper is run through old steel pipe in large or small openings. The center to end dimensions of NORMAC TEES correspond with old malleable iron fittings. This feature is extremely important in the use of these fittings in one foot openings where the tubing must line up with the steel which has been removed.

Write for the NORMAC CATALOG of Gas Distribution Equipment

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Couplings • Meter Bars • Sleeves • Cocks • Bell Joint Clamps • Service Tees & Ells

Present requirements on ignition were interpreted as specifying that ranges should be either fully automatic or fully manual, the manual version requiring match lighting. No compromise between the two systems was deemed acceptable because of safety.

It was agreed that manually controlled ignition systems using electric coils, pilot lights, or other substitutes for matches resemble too closely the operation of fully automatic ranges, do not provide the protection of a safety pilot, and yet might easily be considered fully automatic by inexperienced operators. Since it believes that in time all ranges will be fully automatic, the committee feels that it is best to keep a definite distinction between manual and automatic operation.

Another action taken by the range group was to permit the lighting of simmer burners from their main burners. Mandatory provisions call for top burner valves to have the same direction and degree of rotation at which ignition takes place, and recommended provisions are that all valves have the same limit of rotation and sequence of control. In addition, the committee adopted requirements for double coaxial orifices and reduced the specified size of pans that top burner grates are required to support.

Procedure for the storage heater temperature limit test was revised by the water heater committee. The gas piping and appliance installation group was mainly concerned with clarification of venting provisions, particularly those regarding automatic control of unvented space heaters.

SGA Executive Committee Names 1952 Leaders

Plans for the Southern Gas Assn.'s 44th annual convention, to be held April 28-30 in Galveston, were approved at an executive committee gathering at Houston's Shamrock hotel, Dec. 7.

Dale E. Frieden, Zenith Gas System Inc., was chosen as chairman of the general convention committee, which also includes Charles F. Stubbs, Mississippi Gas Co.; A. B. Parker, Hardwick Stove Co.; W. M. Wampler, Chattanooga Gas Co.; H. R. Derrick, Alabama Gas Corp.; Harold F. Taylor, Oklahoma Natural; J. O. Jackson, United Gas; and A. L. Roberts, Texas Gas Transmission. In addition, seven convention committee chairmen were named, and section and special committee chairmen for 1952-53 were chosen.

The association decided to amend its constitution and by-laws to increase the board of directors from 12 to 15 members. Two resolutions were adopted — one advising manufacturer members of the association's policy of non-entertainment at round table conferences, the other endorsing the AGA's proposed television recommendation for the American gas industry.

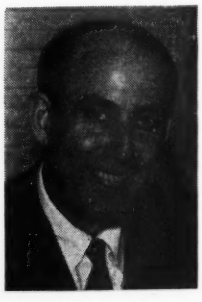
Lee A. Brand Re-elected

Lee A. Brand, vice president of Empire Stove Co., Belleville, Ill., was re-elected chairman of the National Committee for LP-Gas Promotion at an early December meeting held in St. Louis.

Mr. Brand, who has been prominent in the gas industry for 30 years, was originally named to the post in February 1950.

Oklahoma Utilities Assn. 1952 Officials Elected

Richard W. Camp, vice president, Consolidated Gas Utilities Corp., Oklahoma City, was elected president of the Oklahoma Utilities Assn. at a Dec. 13 meeting of the board of directors. He succeeds C. N. Robinson, Tulsa.



Richard W. Camp

Other officers elected for 1952 were W. R. Wolfe, first vice president; Earl J. Newlin, Oklahoma City, second vice president; H. H. Ferrin, re-elected treasurer; Kate A. Niblack, re-elected secretary; and Thelma T. Jones, appointed assistant secretary.

Three-year directors are R. K. Lane and D. J. Tuepker, both of Tulsa; and one-year directors are C. G. Barndt, Sulphur; Carl E. Cloud, Tulsa; Marlow Paul, Woodward; A. F. Potter, Bartlesville; and D. S. Kennedy and W. R. Wolfe, Oklahoma City.

The group's 1952 convention will be held in Oklahoma City on March 27-28.

WOW!

The Gal would no doubt be welcome on a desert isle, back row of a movie, Saturday night square dance or any other civil (or un-civil) occasion. All Right, All Right, the Gal's name is Maude and her phone number is Webster 1941. Now, will you read the rest of this?

You'll admit she's pretty, but, have you seen one of our insulating bushings designed especially for gas meter service? How about letting us send you testing samples, the bushings that is, they'll speak for themselves. (Sure wish I had that Monkey's job!)

ALL TYPES OF INSULATION
CALL • • WIRE • • WRITE

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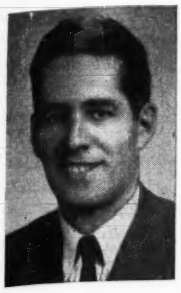
PEOPLE

In recognition of his pioneering work in the development of new gas utilizations, H. B. Wilson, manager of Brooklyn (N.Y.) Union Gas Co.'s commercial sales section, has received a special award from the company. During the past five years, he has not only extended the use of gas in the commercial cooking, water heating, and space heating fields, but has also designed the equipment necessary to put his ideas into practice. The citation said, in part, "By successfully concluding all phases of his program, Mr. Wilson has performed a great service for Brooklyn Union and for the gas industry. (This award is given) in recognition of his imagination, knowledge, and perseverance."



H. B. Wilson

C. G. KLOCK has been named manager of finance for General Electric Co.'s air conditioning division, Bloomfield, N. J., succeeding R. E. WHITMYER, who will join the company's aircraft gas turbine department at Lockland, Ohio. Mr. Klock, a member of the board of directors of the New Jersey Credit Executives, has been with the company since 1940.

All members of Oklahoma Natural Gas Co.'s (Tulsa) board of directors were elected at the annual meeting held Dec. 4 in Wilmington, Del. Included were Joseph Bowes, president; George Frederickson, vice president; F. W. Peters, vice president and secretary-treasurer; and J. A. La Fortune, executive vice president of Warren Petroleum Corp.

On Nov. 1, E. O. WERBA became chief engineer of Atlanta (Ga.) Gas Light Co., a position long held by E. C. KOLLOCK, who is now engineer consultant. Since June 1950, Mr. Werba had been assistant chief engineer.

A. O. Smith Corp., Milwaukee, has named CHARLES SMITH manager of the Chicago product service division, succeeding J. W. SPOOR, who was named general sales manager of the welding products division. P. H. FAHRER, former manager of the Los Angeles product service branch, moves to Chicago as Mr. Smith's assistant, and succeeding him in Los Angeles is GEORGE CARLSON, formerly assistant at the Union, N. J. branch.

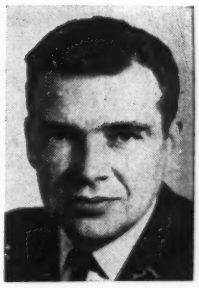
P. H. Fahrer

Charles Smith

After five years as advertising agency account executive for Caloric Stove Corp., Philadelphia, GEORGE MILLER has joined the company as advertising director. Operating out of the home office, Mr. Miller will also direct a complete advertising department at the firm's Topton, Pa. plant. For some time he has supervised production of the *Caloric Chronicle*, daily convention newspaper issued at annual AGA and SGA meetings.

Consolidated Engineering Corp., Pasadena, Calif., has appointed JOSEPH H. LANCOR JR. director of the transducer division. He will direct design and development of

George Miller
. . . Caloric



J. H. Lancor Jr.
. . . Cons. Eng.

for longer service life

The finest grade virgin lamb skin is used exclusively in Lancaster Metal Rim Diaphragms. Utmost care in leather selection assures uniformity of leather thickness. This high quality leather is specially tanned by the re-chrome process to retain soft, flexible qualities that mean better service. For extra long life, the leather is treated with LMPCO special formula diaphragm oil which stays in the leather over a 10 year period. *Write today for sample and prices.*

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METER PARTS CO.

Investigate!

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SUPERIOR
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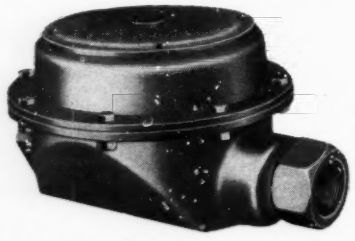
REGULATION



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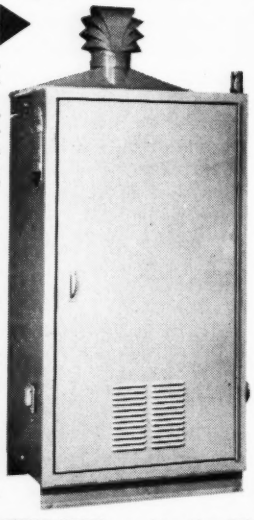
Manufacturers of Norwalk-Connelly Regulators since 1878

New Model **GASAIR**

Direct-Fired Vaporizer-Mixer
Steam Vaporizer-Mixer



Complete gas generator in one package.

No electricity or water needed for operation. A steam vaporizing unit can be supplied where steam is available.

Capacity of standard models direct-fired Vaporizer-Mixers - 5M, 10M, 25M, 50M c.f.h.

Heating values 650 to 1500 BTU maintained within 2%.

Pressures—1 lb gauge at 650 BTU to 5 lbs at 1500 BTU.

Pressures from 5 lbs to 45 lbs by compressing air content only.

A.S.M.E. and Code construction.

Direct-fired VAPORIZERS ONLY capacities 40 to 800 gallons per hour.

Over 800 GASAIRS now in use.

Installations for utilities and industry.

Your inquiry should quote BTU and pressure required.

Write for further information—

GASAIR ASSOCIATES

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'Phone KLondike 2-2510 and 2511

various types, including vibration pickup, pressure pickup, and accelerometers. Mr. Lancor has been director of product engineering for Vitro Corp. of America since 1947 and was previously a research engineer for Sperry Gyroscope. He holds a number of patents for aircraft and radar instruments and music reproduction equipment.

In late November Consumers Power Co., Jackson, Mich., elected JUSTIN R. WHITING to the new position of chairman of the board and chief executive officer, and selected DAN E. KARN, former first vice president, to succeed Mr. Whiting as president. Mr. Whiting has been a director since 1934 and president since 1941. He also served as president of Commonwealth & Southern Corp. until its dissolution in 1949. Mr. Karn was named vice president and general manager of Consumers in 1933, the same year in which he became a director, and he moved up to first vice president in April 1950.

Dan E. Karn
. . . Consumers

J. F. Howley
. . . Brooklyn

After 44 years with Brooklyn (N.Y.) Union Gas Co., the last 22 as manager of its dealer relations section, JAMES F. HOWLEY has retired. He joined the firm in 1907 and had the distinction of selling the first gas refrigerator in the New York City area. When Brooklyn Union adopted its dealer plan in 1929, Mr. Howley's popularity and experience in the field won managership of the program for him. The only interruption in his long career was during World War I when he served with the Army in France and Belgium. During many years on the AGA dealer committee, Mr. Howley made significant contributions to the industry.

DELBERT M. PITMAN, son of the late J. C. Pitman, has succeeded his father as president of J. C. Pitman & Sons Co. Inc., Lynn, Mass. Other new officers elected by the board are DONALD R. PITMAN, vice-president and assistant treasurer; DOUGLAS H. PITMAN, treasurer; and THOMAS E. CANAVAN, sales manager.

A shuffle of district managers has been announced by General Controls Co., Glendale, Calif. JOHN R. FERGUSON, who has headed the Salt Lake City branch, is now at Denver. HERB LINDSTROM, former Denver manager, has moved to Minneapolis.

Recent personnel changes at South Atlantic Gas Co., Orlando, Fla., include the promotion of C. B. REINSCHMIDT, former acting manager of the Savannah division, to vice president and division manager; MAJ. ROYCE A. HOYLE JR., USMCR, sales supervisor who is now returning from Korea, to the newly created post of assistant division manager; J. FRANK LEE from acting sales manager to general manager of domestic

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sales; JAMES B. EARNEST to general manager of commercial sales, and FRANK BARRAGAN JR. to special assistant to the president on customer relations.

Pacific Gas & Electric Co., San Francisco, recently announced the appointment of WALTER DREYER as vice president and chief engineer, succeeding I. C. STEELE, and K. C. CHRISTENSEN as treasurer, replacing E. J. BECKETT. Both Mr. Steele and Mr. Beckett, PG&E employees of 42 and 36 years respectively, have been retired under the company's pension plan.

Rockland Light & Power Co., Nyack, N. Y. has elected MAURICE W. DENNISON a member of its board of directors. Mr. Dennison is a trustee of Braman, Dow & Co., Boston wholesaler of pipe, valves, and fittings.

Ebasco Services Inc. has added JOHN D. FITCH to its consulting engineering department. For the past nine years Mr. Fitch has been with the Export Import Bank, Washington, D. C.

Obituaries

J. PHILLIPS COSGROVE, executive vice president of American Radiator & Standard Sanitary Corp., Pittsburgh, died Dec. 13 in New York after a brief illness. He was 54 years old. Mr. Cosgrove joined American Radiator Co. as a machinist at the Bayonne, N.J. plant after World War I, advanced to foreman, and later entered sales work in the firm's export division.

J. P. Cosgrove

When American Radiator was merged with Standard Sanitary Manufacturing Co. in 1929, Mr. Cosgrove was appointed export manager. Seven years later he was sent to Europe to serve on the board which directed the firm's European affiliates. World War II caused his recall to New York in 1940, and for the next five years he served as director of European divisions. In 1945 he was elected vice president in charge of foreign divisions and served in that capacity until early 1951 when he was named executive vice president.

He had been a member of the board of directors since 1945 and served on the executive committee for the past four years.

R. H. Lewis

Ruud Manufacturing Co., Pittsburgh, lost a prominent executive when RICHARD H. LEWIS died Nov. 13 after a short illness. He was 73. Mr. Lewis was president of the firm from 1944 until September 1951, at which time he became chairman of the board of directors' executive committee. His first job with Ruud, in 1914, was as Iowa sales representative. Four years later he was named Detroit manager and, in 1925, general sales manager. Subsequently he became secretary and treasurer, vice president, and vice president and general manager. He had been a member of the board for 23 years and was formerly a member of the AGA board.

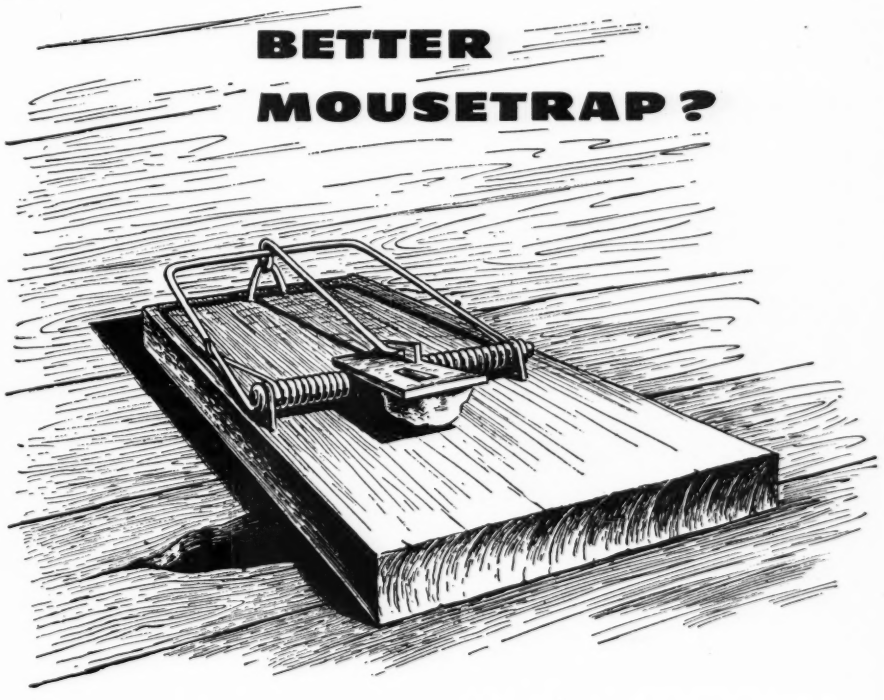
JOHN T. B. COCKE, former superintendent of the gas department, Virginia Electric & Power Co., Newport News, died in late November. Early in his career he joined the United Gas Improvement Co., Philadelphia, and was located at various times in Atlanta and Savannah.

New York State Electric & Gas Corp.'s Geneva district operating superintendent, CHARLES F. MCCANN, died Nov. 11. Mr. McCann, who was 47, had been promoted to the position only a few months ago. Since 1946 he had served as superintendent at Hornell.

CARL F. NILES, 61year-old general foreman of the natural gas division, Iroquois Gas Corp., Buffalo, N. Y., was killed in an automobile accident Dec. 4. Mr. Niles had been associated with the company for 40 years.

DAVID J. BROWN, 65, general operating superintendent of the eastern division of Niagara Mohawk Power Corp., Syracuse, died Nov. 12 in Albany.

MAHLON B. TAYLOR, assistant treasurer, Philadelphia Gas Works Co. since 1941, died Dec. 17 in Philadelphia. Mr. Taylor was 66.



The story of the reward for a better mousetrap is proverbial. But the fact remains that most mice are still caught by this simple, economical and effective contraption.

Gas purification is a parallel case.

Iron Sponge, preferred for the removal of H_2S seventy-five years ago, is still preferred today. And for these same reasons . . . simplicity, economy and effectiveness.

Iron Sponge operates with high efficiency at high or low pressures, has excellent capacity and activity, gives long service between foulings and is simply and quickly regenerated.

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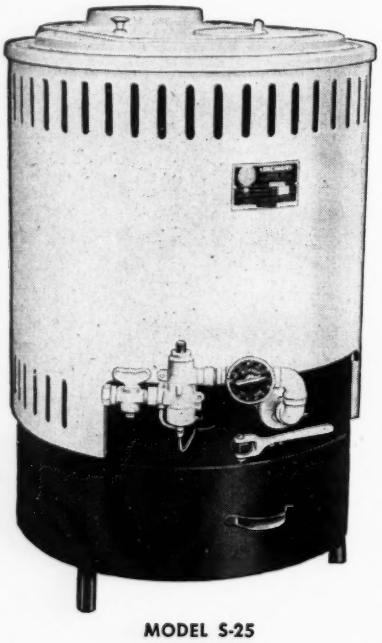

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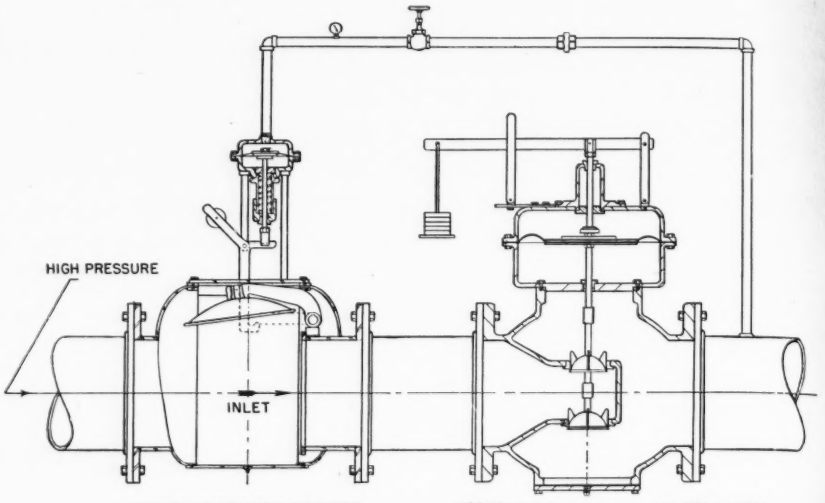


NORWALK DIAPHRAGM OPERATED POSITIVE CUTOFF VALVE

NORWALK (POUNDS TO POUNDS) REGULATOR PAT. PENDING

Cutoff Valve

NORWALK VALVE CO., South Norwalk, Conn.

MODEL: Diaphragm-operated positive cutoff valve.

DESCRIPTION: This valve can be used equally well on low and intermediate pressures. It is actually a fabricated check valve installed "in reverse" and held open by a lever and trigger arrangement. The trigger is released by the operating diaphragm of the small valve, and the diaphragm can be set to spring the trigger at any predetermined pressure. Once the trigger is released, no spring or other medium is required to close the valve. Dropping by gravity, it is held closed by the high pressure. After the danger is past, the valve can be reset manually without disconnecting it.

Several safety measures may be accomplished with this unit, according to the manufacturer. A complete out may be prevented by calculating minimum gas consumption and drilling an orifice in the disc. In case of poor calculation of minimum load, a pressure relief valve may be installed after the safety shutoff and safe pressure is maintained. In this case, the shutoff valve should be downstream from the regulator.

Coupling

PIPE FABRICATING CO., 2216 N. Alameda St., Compton, Calif.

MODEL: Term-X.

APPLICATION: Designed to provide a simple, inexpensive means of terminating a low pressure gas main and to provide a fitting from which the main can be readily extended.

DESCRIPTION: The Term-X consists of a 12-in. length of pipe terminated with the coupling containing the disc. To provide for future extension, the extension is welded to the end of the line, and the coupling is sealed with a standard pipe plug. This welding is done at a distance from the disc of 12 in. so that there is no danger of melting the disc during the operation.

When it is desired to extend the line, the plug is removed and another pipe nipple 12 in. long threaded on one end is screwed into the coupling. After all service taps have been made and the end of the new extension has been sealed, the screwed coupling is welded and a torch is applied outside the pipe to the low melting alloy disc, permitting the gas to flow.

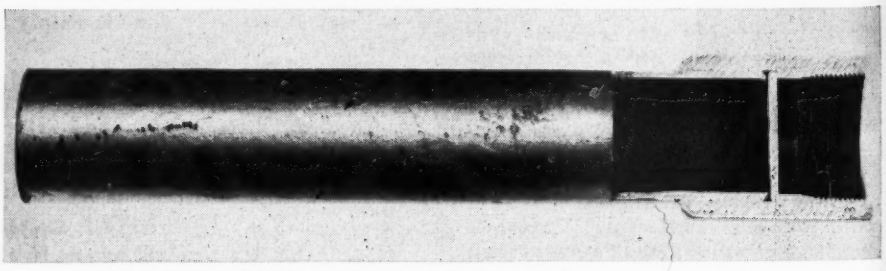
Forced Draft Burner

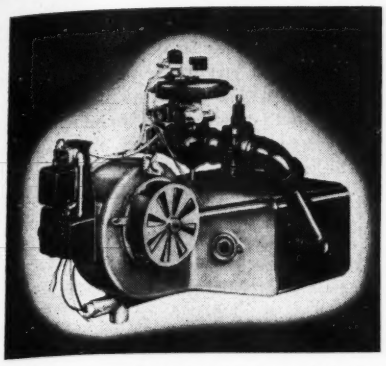
BRYANT INDUSTRIAL DIVISION, 17825 St. Clair Ave., Cleveland 10, Ohio.

MODEL: No. 214 conversion burner.

DESCRIPTION: This compact power-type burner is produced in 11 capacities ranging from 400,000 to 20 million Btu/hr input. It is shipped factory wired and assembled as a unit for easy ashpit installation in furnaces or boilers in large residences, industrial or commercial buildings.

Featured as standard equipment are such controls as automatic electric ignition and electronic flame failure protection, on-off or throttling-off type diaphragm valves, con-





stant air to gas ratio shutter, ceramic burner face, and centrifugal blower type fan.

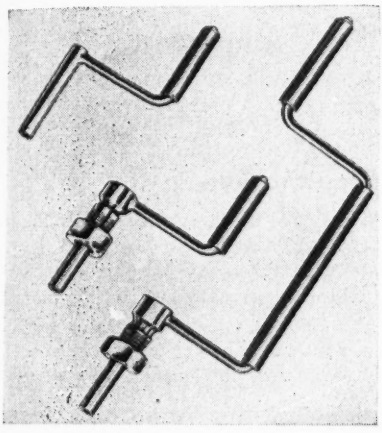
Pilot, ignition electrode, and electronic flame electrode are mounted in fixed positions in a tubular assembly which may be removed for servicing. The pilot burner functions as both an atmospheric and blast type unit and provision is made for primary air adjustment.

Key Winder

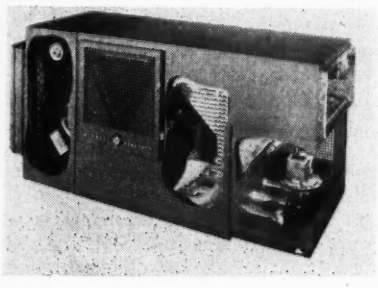
J. A. CAMPBELL CO., 645 E. Wardlow Rd., Long Beach 7, Calif.

MODEL: Winder-Upper, Types A, B, and C.

DESCRIPTION: Keys used to wind spring-driven motors, clocks, temperature controls,



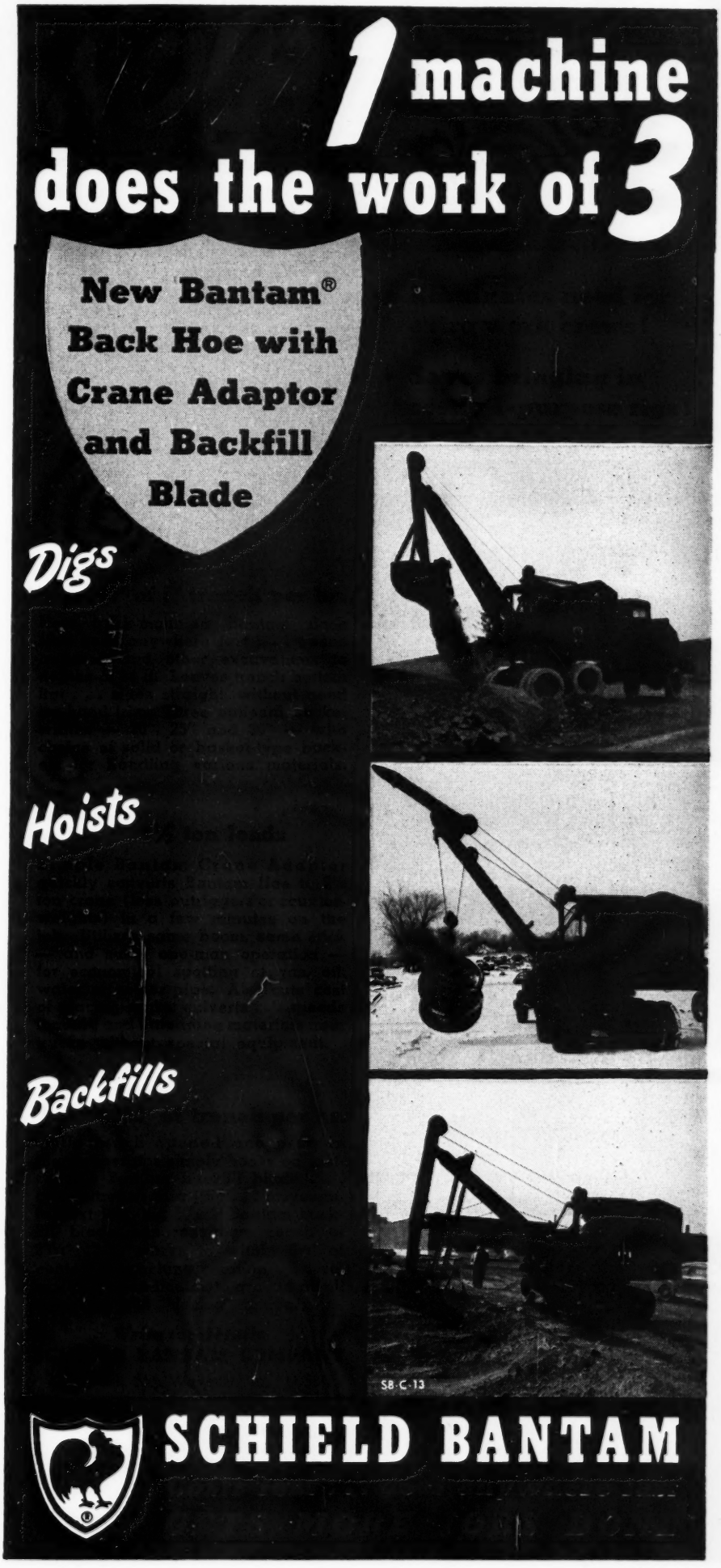
orifice chart meters, etc., become cranks when the Winder-Upper is used. Type A consists of a key end and crank. Type B includes a torque chuck with slip-grip arrangement which converts the crank into a combination torque wrench and crank so the instrument cannot be overwound. Type C is the same as B but uses a brace design to prevent wobble.



Warm Air Furnace

GENERAL ELECTRIC CO., Bloomfield, N. J.

MODEL: Tuck-A-Way horizontal furnace.



APPLICATION: Designed to provide economical automatic home heating where floor space is at a premium.

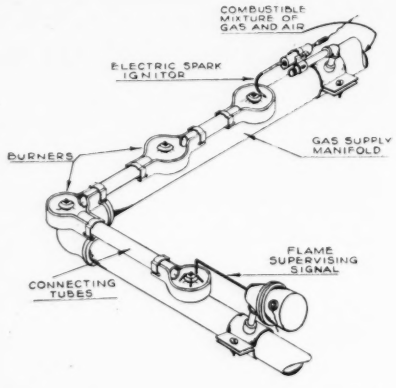
DESCRIPTION: This 28⅜-in. high unit may be mounted on an attic floor under the eaves, or hung from floor joists in basements. The two sizes offered—90,000 and 120,000 Btu input per hour—are AGA approved and listed by Underwriters Laboratories.

Ribbon-type gas burners ignite and go out quietly; a safety pilot provides automatic shutoff in case of pilot failure. GE's "pin-point" heating surface, which works on the principle that a small rod heats faster than a heavy metal bar, is used. The outside of the surface is covered with hundreds of slender iron projections over which air for heating passes. Similar slender rods within the passages through which the hot combustion gases pass serve to gather and conduct heat efficiently to the air passing over the heat exchanger surface.

Burner Ignition System

BURDETT MANUFACTURING CO., 3433 W. Madison St., Chicago 24.

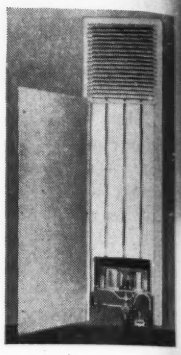
DESCRIPTION: A patent has been issued on this system for igniting Burdett Radiant-Heat burners. Arranged in series upon a gas supply manifold, the burners are ignited at one end by an electric spark when a manual pushbutton is depressed. The closed circuit also energizes the automatic gas supply valve at the same instant, permitting gas to reach



all of the burners by means of the manifold and connecting tubes.

A flame supervising device is located at the last burner of the series, at the end opposite the ignitor. If its contacts are not closed by the flame in the ignited burner, upon release of the manual button the automatic gas supply valve will close, shutting off the gas supply to all the burners. If the flame supervising device contacts are closed, as they should be in normal operation, upon release of the pushbutton the automatic gas supply valve will remain open.

Wall Heater



WILLIAMS RADIATOR CO., 1821 Flower St., Glendale 1, Calif.

MODEL: Uniflow.

DESCRIPTION: This AGA-approved heater employs the new vent dilution system which enables it to discharge heat from its entire register area. Non-vision, full-flow louvres direct heat into the room and away from the walls. Both single and dual models slip between two standard 4-in. studs on 16-in. centers. A hinge arrangement allows the wall panel to swing open, providing access to controls.

Two sizes have been available—the 25,000-Btu single and 45,000-Btu dual units. Three additional sizes were scheduled for release Dec. 1: a 35,000-Btu single, and two dual units of 35,000 and 57,000 Btu capacity.

Domestic Range

WESTERN-HOLLY, 8536 Hays St., Culver City, Calif.

MODEL: D-511.

DESCRIPTION: Features of this 37-in. wide range are the disappearing shelf, 18-in. expandable baking oven, glide-out chop broiler, storage drawer, and a Barbecue-Broyl

high oven. The D-511 is the first gas range to be equipped with Flexi-Plates, top burner elements developed by the manufacturer to combine the advantages of both direct flame-to-pan cooking and solid-burner-top cooking. Either method is instantly available.

Optional equipment includes the vanishing grill, Telechron clock control plus Minit Master timer, clock, Visu-Clear pyrex oven window with light, and colored range top in yellow, green, or blue.

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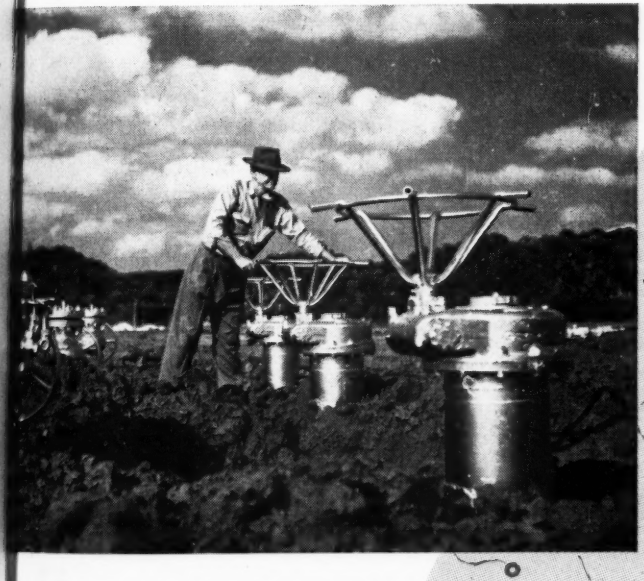
GAS PIPELINE NEWS AND FEATURES

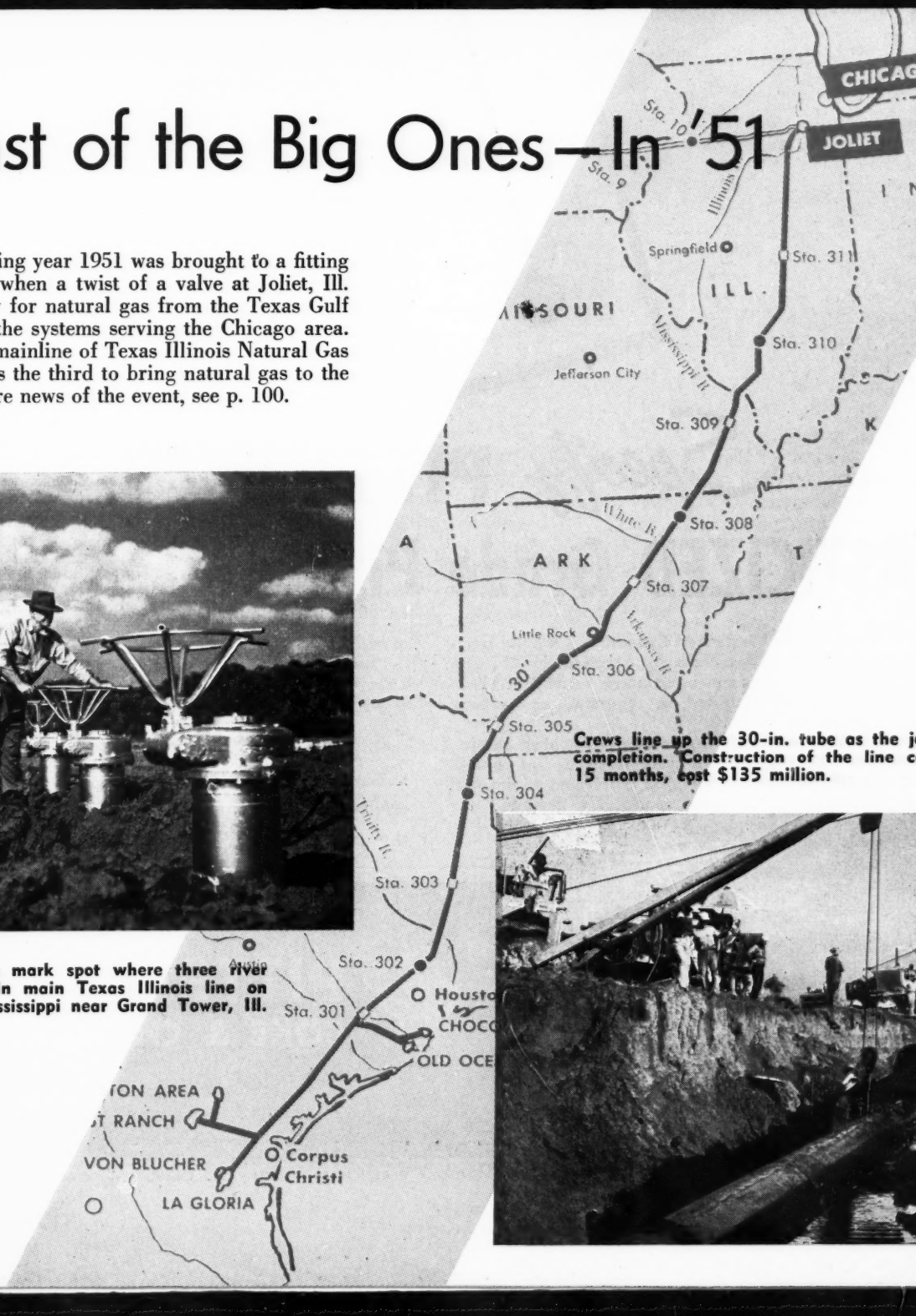
JANUARY, 1952

Last of the Big Ones—In '51

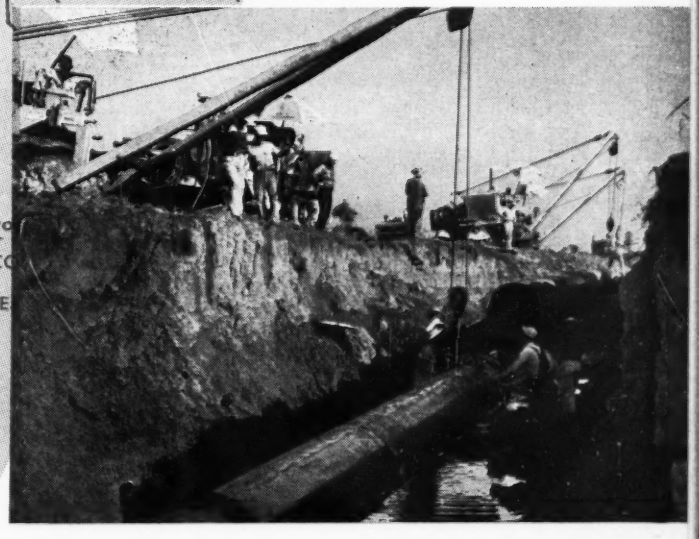
The big pipelining year 1951 was brought to a fitting climax Dec. 5, when a twist of a valve at Joliet, Ill. cleared the way for natural gas from the Texas Gulf Coast to enter the systems serving the Chicago area. The 1417-mile mainline of Texas Illinois Natural Gas Pipe Line Co. is the third to bring natural gas to the region. For more news of the event, see p. 100.

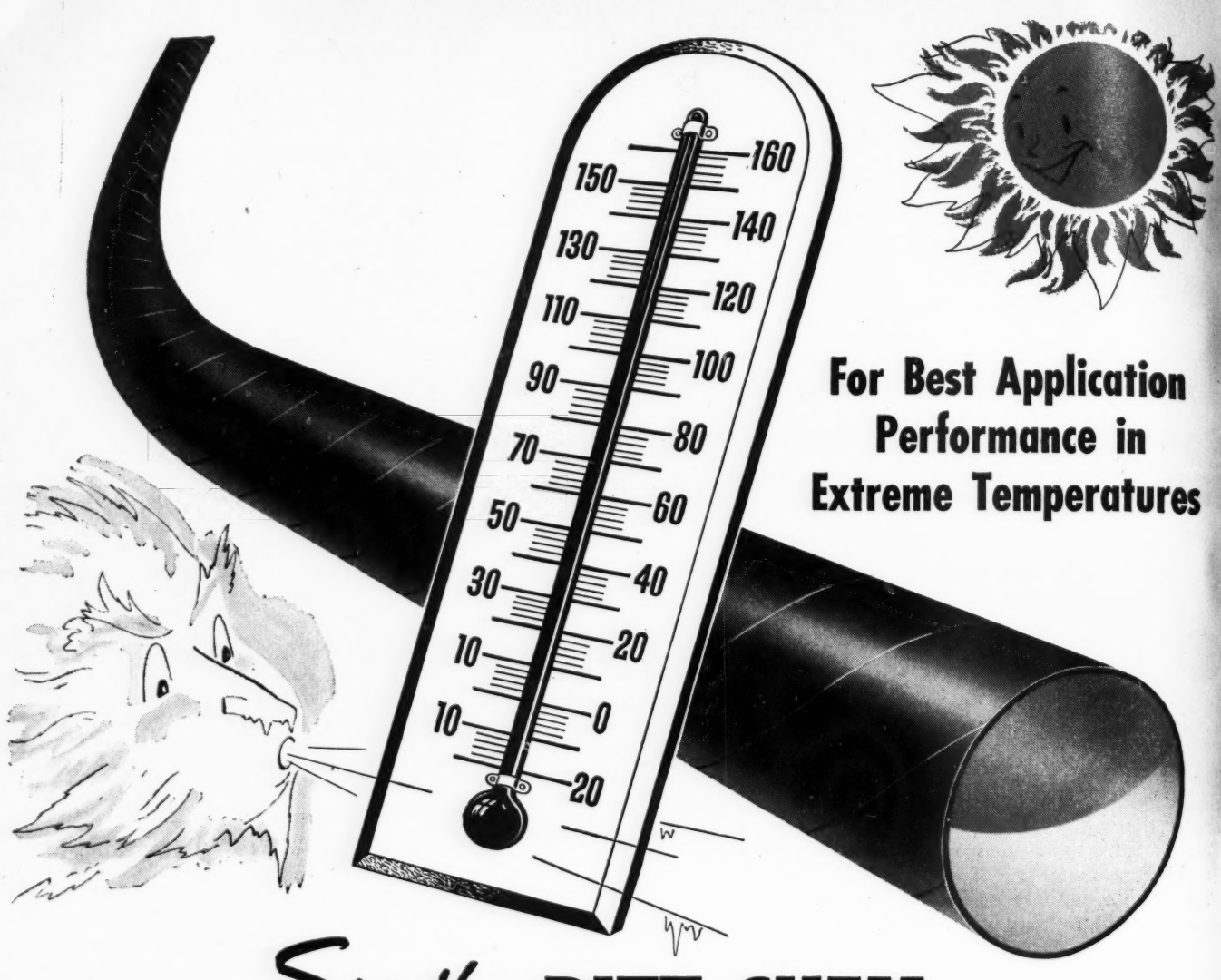


Glistening valves mark spot where three river crossing lines join main Texas Illinois line on east bank of Mississippi near Grand Tower, Ill.



Crews line up the 30-in. tube as the job nears completion. Construction of the line consumed 15 months, cost $135 million.





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● *We're always ready to help you do a better and faster pipeline coating job. Just drop us a line and we'll immediately send you specification sheets and technical information . . . or provide the field application assistance you need.*

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★ Modified Grade Tar Base Enamel

★ Plasticized Grade Tar Base Enamel

★ Cold Applied Tar Base Coatings

★ Synthetic Protective Coatings

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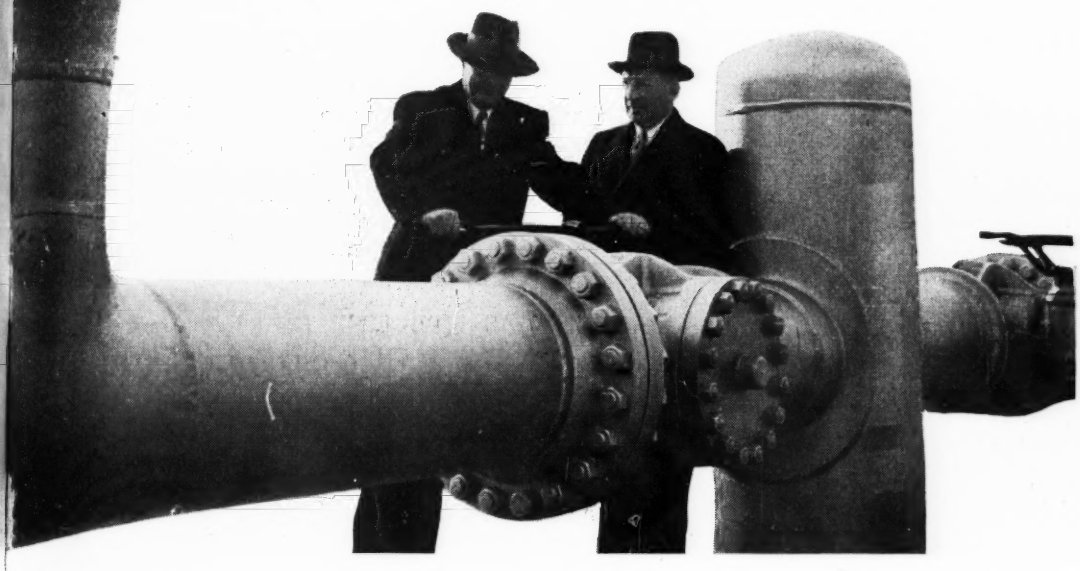
1951 Certifications Point to Full Construction Year in 1952



Presaging an auspicious year in gas pipelining, on Jan. 16, 1951, Claude Williams, president of Transcontinental Gas, and New York PSC chairman Benjamin Feinberg, spun a valve wheel that turned Texas gas into Manhattan mains for the first time in history.

IF the materials squeeze becomes in actuality no worse than now envisioned, natural gas pipeliners on Jan. 1 stand on the threshold of another tremendous year of construction activity. Having set new annual dollar-volume records in 1951, crews are set to complete the construction of more than $500 million worth of programs that were certificated during the year.

Through mid-December, the Federal Power Commission, fully cognizant of the serious need of more and yet more gas for needy areas, stamped its approval on applications for interstate lines totaling 5768 miles in length, augmented by compressor horsepower aggregating more than 424,700.

1951 Compares Favorably

The year's approvals compare favorably with 1950's, when the materials situation is considered. In that year, certificates were issued for more than $700 million worth of work, entailing the laying of more than 8000 miles of pipe. They compare even better with the three previous post-war years, for in 1949, only slightly more was budgeted for about 600 more miles of line; in 1948, although 8500 miles was approved, the overall cost was less; and in 1947, mileage approved totaled only slightly more than 5000.

Accurate forecasts for next year's work based on such comparisons are, of course, impossible. Much of the work approved in 1951 was completed in the same year; on the other hand, some approved in 1950 still remains to be finished. One survey, conducted in late autumn, reported that more than 11,000 miles of line had been completed or were under way in 1951—representing jobs that had strung out for a year or more.

Nonetheless, a great deal of work remains to wind up projects certified in 1951. Some big inches were approved, and many will not be ready to carry gas until the next heating season. There's Algonquin Gas Transmission Co.'s 532-mile (main and lateral) job, costing $30 million, and yet to be completed; Texas Eastern's big new $96 million tube from Kosciusko, Miss., to Pennsylvania; United Gas Corp.'s $111 million expansion program, with 1000 miles of pipe to be laid; the looping and storage project of Tennessee Gas, costing $95 million; and Northern Natural and El Paso Natural looping operations, costing $33 million and $24 million respectively.

Texas Illinois Last Big Job

Some of these passed FPC inspection early in the year, before the government tightened controls; yet, after some foot-dragging in the late summer months, business perked up again in the fall to set the stage for a good deal of 1952's planned activity.

Completions in 1951 were breathtaking in scope. Last of the big ones (see Pipeline Section cover) was the Texas Illinois job and first was the Texas-to-New York line, pictured above, which was dedicated Jan. 16.

For a roundup of major pipeline projects approved by the commission between Jan. 1 and Dec. 12, 1951, turn to p. 87.

FPC Approved More Than $500 Million in Pipeline Jobs in 1951

FPC 1951 Certificates Topped $500 Million

Fifty-six pipeline approvals brought activity close to peak levels, set up major programs for completion in 1952.

SOUTHERN NATURAL GAS CO., Birmingham. Docket G-1435. To serve Hokes Bluff, Helena, Eden, Columbiana, Morris, and Warrior, Ala. and Atlanta Gas Light Co. 3½ miles of 24-in. loop line in Carroll county, Ga. and an additional 700 hp at Tarrant compressor station. Cost $287,840. Initial peak day increase, 8 MMcf. Approved Jan. 29.

LAKE SHORE PIPE LINE CO., Cleveland. Docket G-1210. A 10¾-in., 45-mile line extending northeasterly from a point of interconnection with Tennessee Gas Transmission Co.'s system near Meadville, Pa. to Ashtabula, Ohio. Customers: Lake Shore Gas Co., Lake County Gas Co., City of Painesville, and Diamond Alkali Co., Painesville. Cost $1,450,000. Capacity, 17 MMcf. Approved Feb. 15.

ALGONQUIN GAS TRANSMISSION CO., Boston. Docket G-1447 et al, for 253 miles of main line and 279 miles of laterals in New England states. Customers in Massachusetts include Brockton Gas Light Co., Taunton Gas Light Co., Fall River Gas Works Co., Cambridge Gas Light Co., Dedham & Hyde Park Gas Co., New Bedford Gas & Edison Light Co., Plymouth Gas Light Co., Milford Gas Light Co., Boston Consolidated Gas Co., Old Colony Gas Co., Buzzards Bay Gas Co., and Norwood Gas Co. In Rhode Island, Blackstone Valley Gas & Electric Co., Providence Gas Co., Newport Gas Light Co., and Narragansett Electric Co. (Westerly, Bristol-Warren). In Connecticut, Connecticut Light & Power Co. (New London, Waterbury, New Haven, Willimantic, Putnam), New Haven Gas Light Co., Mystic Power Co., Hartford Gas Co., and Norwich Gas & Electric Co.; and Jersey Central Power & Light Co. in New Jersey. Cost $30,477,800. Capacity, 217.8 MMcf. Approved Feb. 27.

TEXAS EASTERN TRANSMISSION CORP., Shreveport. Docket G-1447 et al, for 791 miles of 30-in. extending from United Natural Gas Co.'s system near Kosciusko, Miss. through Alabama, Tennessee, Kentucky, and Ohio to a connection with Texas Eastern's system near Connellsville, Pa. including 13 compressor stations aggregating 96,400 hp. Customers include Consolidated Natural Gas Co., Columbia Gas System, Equitable Gas Co., Carnegie Natural Gas Co., Waynesburg Home Gas Co., National Gas & Oil Corp., Associated Natural Gas Co., Missouri Utilities Co., County Gas Co., Algonquin Gas Transmission Co., Jersey Central Power & Light Co., Borough of Chambersburg, Pa., Arkansas-Missouri Power Co., City Gas Co. of Phillipsburg, N. J. Cost $96,305,118. Capacity, 390,250 Mcf. Approved Feb. 27.

UNITED GAS PIPE LINE CO., Shreveport. Docket G-1447, for 305 miles of 30-, 26-, 24-, and 20-in. line from near the Eugene Island area of the Gulf of Mexico through Louisiana to near Kosciusko, Miss. with an aggregate compression of 20,800 hp; three supply and delivery lines 179 miles long from southern and southeastern Louisiana and Mississippi to various points of connection with the east line, and 510 miles of 30-, 26-, and 24-in. line from southern Texas northeast to Perryville, La., including compression facilities aggregating 42,200 hp. Customers include Texas Eastern Transmission Corp. and Mississippi River Fuel Corp. Capacity, 920 MMcf. Cost $111,861,749. Approved Feb. 27.

KANSAS NEBRASKA NATURAL GAS CO., Phillipsburg, Kan. Docket G-1532. To meet increased demands and serve new markets, 515 miles of pipeline in Kansas and Nebraska; three new compressor stations totaling 3570 hp; an additional 200 hp at Palco, Kan., and a 44-MMcf dehydration plant at Holcomb, Kan. Customers served retail include the Nebraska towns of Palmer, St. Paul, Fullerton, Belgrade, Genca, St. Edward, Cedar Rapids, Albion, Petersburg, Elgin, Oakdale, Neligh, Clearwater, Ewing, Orchard, Page, Inman, O'Neill, Plainview, Creighton, Osmond, Wausa, Bloomfield, Randolph, Coleridge, Laural, and Hartington. To be served wholesale through Central Electric & Gas Co. are Pierce Newman Grove, Lindsay, Humphrey, Madison, Battle Creek, Meadow Grove, Tilden, Norfolk, and Stanton. Cost $5,210,266. Capacity increase, 18.2 MMcf. Approved March 1.

UNITED GAS PIPE LINE CO., Shreveport. Docket G-1574. To increase system capacity, 11 miles of 14-in. line in the Gulf. Cost $1,151,657. Approved March 2.

TRANSCONTINENTAL GAS PIPE LINE CORP., Houston. Docket G-1518. 8.5 miles of 30-in. and 8.5 miles of 10¾-in. line from the company's main transmission line in Bergen county, N. J. to Paterson (N. J.) Gas Works (Public Service Electric & Gas Co.), and increase total horsepower of 6 authorized stations from 61,760 to 67,100 hp. Cost $13,292,488. Approved March 7.

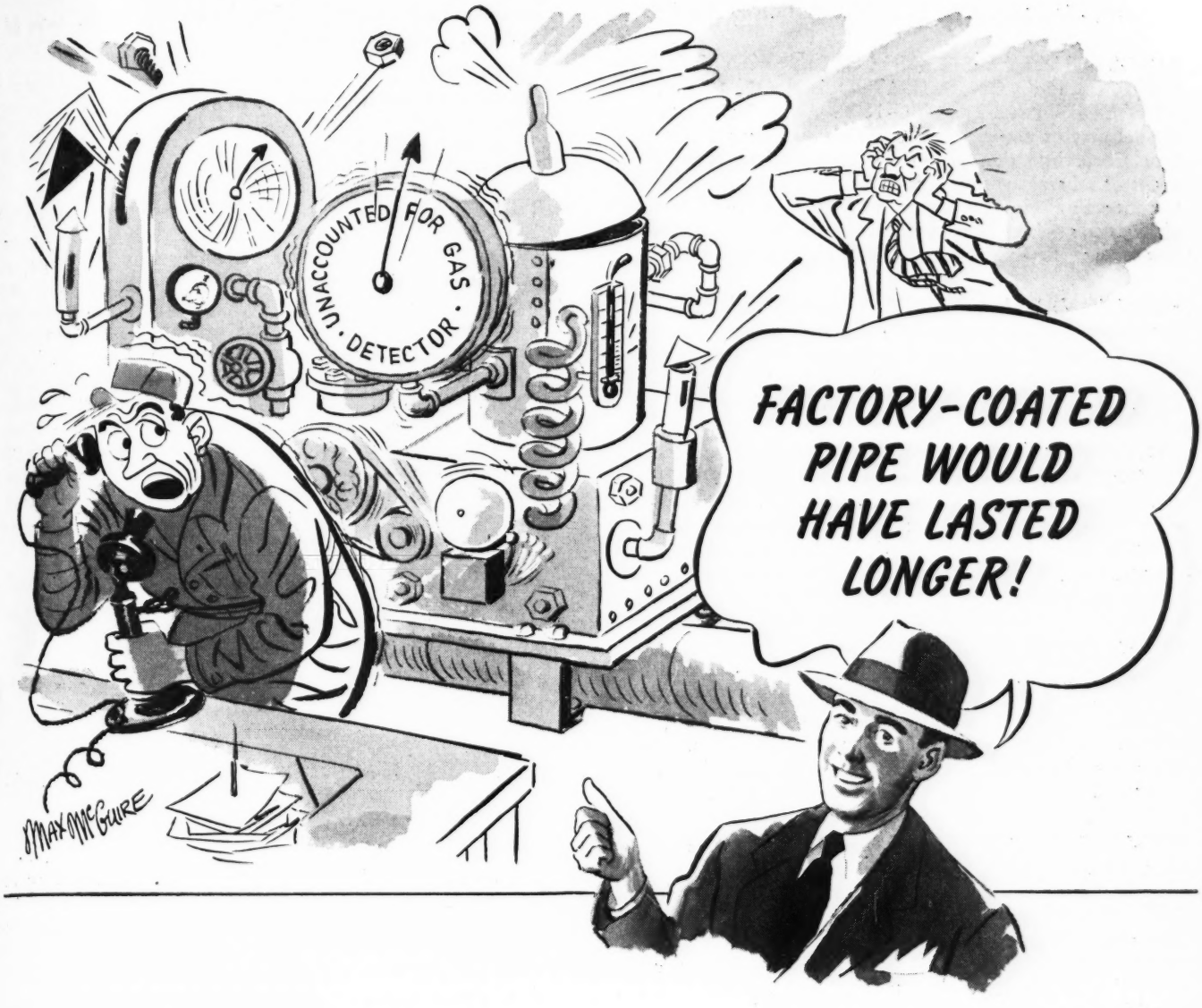
WABASH NATURAL GAS CO., Carmi, Ill. Docket G-1468. To transport natural gas for Consumers Gas Co.'s distribution in Carmi, Ill., one-half mile of 4-in. line connecting with Texas Eastern Transmission Corp.'s facilities. Cost $15,000. Capacity, 500 Mcf. Approved March 16.

NORTHEASTERN GAS TRANSMISSION CO., Springfield, Mass. Docket G-1267. To provide service to presently authorized customers, to meet emergency demands and to provide service in northern Massachusetts, Maine, New Hampshire, and Vermont, substitution of 24-in. for 20-in. pipe on 144 miles of authorized main transmission line and substitution of larger pipe on five lateral lines in Massachusetts. Cost $2,314,000. Capacity increase, 75 MMcf. Approved March 29.

EQUITABLE GAS CO., Pittsburgh. Docket G-1565. To store 13 billion cu ft of gas in the Bunola storage pool with a deliverability in 1954 into the company's overall system of 80 MMcf daily, a compressor station and appurtenant equipment to compress gas into Finleyville, Tepe, and Bunola storage pools. Cost $1,055,739. Approved March 29.

TEXAS GAS TRANSMISSION CORP., Owensboro, Ky. Docket G-1593. For operation of the Alford underground storage field near Petersburg, Ind. making available from storage 30 MMcf per day, 12 miles of connecting line; 1200-hp compressor station, storage gas measuring station and 4.5 miles field lines. Cost $938,811. Approved March 29.

INTERSTATE POWER CO., Dubuque, Iowa. Docket G-1547. To serve natural gas to the Clinton, Iowa area (now using manufactured gas), 26.5 miles of 8⅝-in. line connecting with Natural Gas Pipeline Co. of America's system near Hooppole, Ill. extending to the east side of the Mississippi river through a double submarine crossing.



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Capacity, 2733 Mcf. Cost $749,000. Approved April 5.

KINGS COUNTY LIGHTING CO., BROOKLYN UNION GAS CO., and CONSOLIDATED EDISON CORP. OF NEW YORK INC. Docket G-1602. As an alternate means for delivery of natural gas from Transcontinental Gas Pipe Line Corp. into the New York metropolitan area in the event of a break or stoppage in Transco's line, facilities interconnecting with the terminus of the "Narrows Crossing" of Transco's system at the entrance of the New York harbor, Bay Bridge, Brooklyn. Cost $698,000. Approved April 6.

PENNSYLVANIA GAS CO., Warren. Docket G-1620. For transportation of gas to the company's storage areas in the summer, 52 miles of 12¾-in. line and 5 compressor stations aggregating 1430 hp augmenting supply of gas to Corry and Erie, Pa. Cost $2,200,000. Approved May 3.

UNITED GAS PIPE LINE CO., Shreveport. Docket G-1628. To serve new markets including Saufley field, Elgin Air Force Base and the Florida towns of Fort Walton, Niceville, Valpariso, Crestview, and DeFuniak Springs, 39 miles of 16-in. loop line from Baldwin county, Ala. to Escambia county, Fla., and two laterals totaling 10 miles with appurtenant equipment. Cost $1,945,000. Approved May 4.

CITIES SERVICE GAS CO., Oklahoma City. Dockets G-1589 and G-1590. To increase capacity at the company's Springfield system and in the Wichita-Newton-Hutchison area, 56 miles of 16-, 10¾-, and 3-in. line in Sedgwick, Harvey, and Labette counties, Kan. and installation of 13,080 hp at new and existing compressor stations. Added capacity, 66,430 Mcf. Cost $5,186,610. Approved May 17.

NEW YORK STATE NATURAL GAS CORP., New York City. Docket G-1601. For utilization of South Bend storage area in Armstrong and Indiana counties, Pa., 17 miles of 20-in. from a point on the Ohio-Pennsylvania state line in Lawrence county, Pa.; 17 miles of field lines and a 12,000-hp compressor station, with additional gas made available delivered to Peoples Natural Gas Co. and East Ohio Gas Co. Cost $8,969,100. Approved June 1.

EAST OHIO GAS CO., Cleveland. Docket G-1571. For 65 miles of 26-in. line connecting with the line built by New York State Natural (see above) extending to a point in Twinsburg township, Summitt county, Ohio. Cost $4,382,170. Approved June 1.

OHIO FUEL GAS CO. Docket G-1594. To convert 6 natural gas producing pools in Hocking, Knox, and Pavonia counties, Ohio to storage service, 74.2 miles of 3½-in. to 20-in.; 47.5 miles 20-in. and installation of additional 8480 hp at stations. Cost $6,425,200. Approved June 1.

TENNESSEE GAS TRANSMISSION CO. Dockets G-1573, G-1614, and G-1599. To increase the daily delivery capacity and develop and utilize an underground storage area in Hebron field in Potter county, Pa. (the latter a joint project with United Natural); 419 miles of 26-, and 30-in. loop line along presently authorized system; 142 miles 24-in. new line; 200 miles various diameter lateral lines; 54,100 at existing and previously authorized stations, and 21,120 hp at new station at Hebron field. Customers to be served include Manufacturers Light & Heat, Iroquois Gas Corp., Equitable Gas Co., and United Natural Gas Co. The FPC denied 162 miles of new line, 109 miles of loop lines and 300 hp additional compressor capacity. Estimated cost, including those authorized and denied, $94,869,000. Capacity increase, 85 MMcf. Approved June 1.

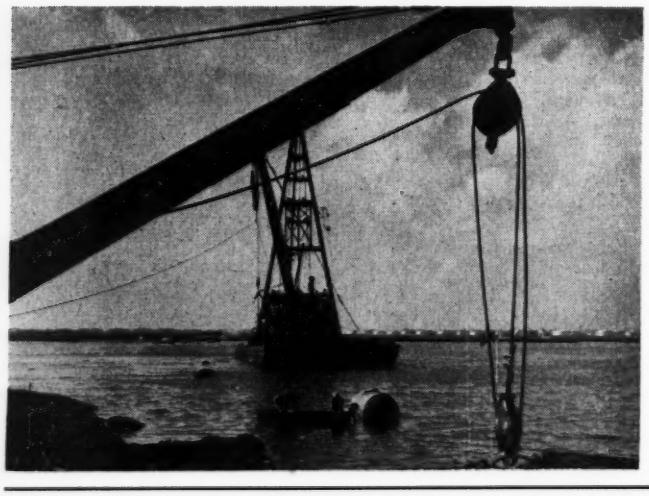
MISSISSIPPI RIVER FUEL CORP., St. Louis. Docket G-1653. To draw upon two additional sources of natural gas, 98 miles of transmission line in Louisiana and Texas and an 11-mile, 10-in. lateral in Harrison county, Texas. Cost $5,135,070. (In addition a gathering system in Woodlawn, Texas field. Cost $489,147.) Approved June 4.

TRANSCONTINENTAL GAS PIPE LINE CORP., Houston. Docket G-1685. For an auxiliary pipeline crossing of the Delaware river near Marcus Hook, Pa. Cost $1,123,415. Approved June 4.

CAROLINA NATURAL GAS CORP., Charlotte, N. C. Docket G-1335. Two sales laterals, each originating at a separate connection with Transcontinental Gas Pipe Line Corp.'s main line. One lateral will serve Hickory, Newton, Conover, Granite Falls, Lenoir, and Lincolnton, S. C. and the other will serve Lexington and Thomasville, N. C. Cost $936,334. Capacity, 3235 Mcf. Approved June 7.

PUBLIC SERVICE OF NORTH CAROLINA INC., Gastonia. Docket G-1335, for five sales laterals, four originating at separate connections with Transcontinental's main line and one with Piedmont Natural Gas Co. Inc., totaling

String of pontoons holds Transcontinental's 24-in. pipe above the bottom of the Arthur Kill in this view of operations, completed last month, which will link New Jersey with a line across Staten Island. Early this year, a crossing of the Narrows will extend the line to Brooklyn, providing a direct route for gas from Texas.



Large pontoon pops to the surface as it is released to permit the 1600-ft line to settle into its 20-ft ditch. This was the first instance of the use, in the East, of the flotation process, a technique proved in operations along the Gulf coast. Its inventor, S. V. Collins of Collins Construction Co., Houston, supervised the job.

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COLORADO-WYOMING GAS CO., Denver. Docket G-1534. To supply gas to its parent, Public Service Co. of Colorado, for resale in Westminster, Eastlake, Lafayette, Louisville, Campion, and Mount Olivet, with Colorado-Wyoming to supply Greeley Gas & Fuel Co. for resale in Pierce, Nunn, and Platteville, to construct lateral lines and meter station, replace certain existing lines with larger sized pipe, and abandon, salvage or sell certain other facilities. Cost $771,850, total retirements $229,756, net property increase $542,094. Approved June 11.

NORTHERN NATURAL GAS CO., Omaha. Docket G-1618. To up capacity 50 MMcf per day, 221 miles of pipeline additions in Texas, Oklahoma, Kansas, Nebraska, Minnesota, and compressor additions totaling 84,000 hp in Texas, Kansas, Nebraska and Iowa. Cost $33,095,000. Approved June 29.

UNITED NATURAL GAS CO., Oil City, Pa. Docket G-1644. To increase volume of gas for peak demand of its customers, 10 miles of new line in Elk, McKean, and Venango counties, Pa. and two 150-hp units at existing compressor stations. Cost $654,500. Approved July 12.

HOPE NATURAL GAS CO., Clarksburg, W. Va. Docket G-1635. To meet increased requirements of customers in Fairmont, W. Va., 32.5 miles of pipeline in West Virginia connecting the company's natural gas transmission system with Terra Alta field. Cost $831,000. Approved July 19.

ASSOCIATED NATURAL GAS CO., Tulsa. Docket G-1689, for 88 miles of line, town border and distribution regulator stations and distribution facilities to serve 13 towns in Missouri including Chaffee, Benton, East Prairie, Morehouse, Charleston, Lilbourn, Bloomfield, Essex, Bernie, Kennett, Holcomb, Clarkton, and Malden. Cost $2,425,042. Capacity, 4400 Mcf. Approved July 31.

ALABAMA-TENNESSEE NATURAL GAS CO., Florence, Ala. Docket G-1624, for 8 line taps and meter and regulator stations to sell and deliver natural gas to Muscle Shoals Natural Gas Corp. for resale in Barton, Belle Mina, Flint, Greenbrier, Margerum, Pride School Settlement, Pryor and Tanner, Ala. Capacity, 380 Mcf. Approved Aug. 9.

MISSISSIPPI RIVER FUEL CORP., St. Louis. Docket G-1581. For development of Waterloo, Ill. storage field, 25 wells, 16.2 miles of line, an 1800-hp station, 75-MMcf capacity dehydration plant and appurtenant facilities. Cost $2,000,000. Approved Aug. 17.

EAST TENNESSEE NATURAL GAS CO., Knoxville. Dockets G-1065 and G-1517. To serve Cookville, Gallatin, and Harriman, Tenn., three laterals totaling 8 miles, together with physical connections, metering, measuring and regulating equipment. Cost $105,000. Approved Aug. 28.

NEW YORK STATE NATURAL GAS CORP., New York City. Docket G-1701. To assure delivery of adequate supplies to Niagara Mohawk Power Corp., which supplies Syracuse, Albany, and Utica, and New York State Electric & Gas Corp., whose area includes Auburn, Ithaca, and Cortland, 6600-hp station at Dryden, N. Y. and 32.5 miles 20-in. Dryden to Therm City. Cost $3,620,533. Approved Aug. 29.

EL PASO NATURAL GAS CO. Dockets G-1729 and G-1730. To construct a 1980-hp compressor station near the Shell Oil Co.'s TXL plant in Ector county, Texas to transport 17.8 MMcf additional natural gas daily to El Paso's Keystone plant. Cost $291,000. Approved Sept. 10.

UNITED FUEL GAS CO., Charleston, W. Va. Docket G-1667. To expand the company's underground natural gas storage operations, 45 miles of line in West Virginia, a 2640-hp compressor station with dehydration plant, and transfer of 1000-hp unit from Walgrove to Kanawha station. Cost $4,755,830. Approved Sept. 10.

MICHIGAN GAS UTILITIES CO. (formerly National Utilities Co. of Michigan). Docket G-1625. To bring natural gas to Coldwater, Hillsdale, Sturgis, Bronson, Quincy, Tekonsha, Union City, Jonesville, and Burr Oak, 77 miles of line in south central Michigan. Cost $1,500,000. Capacity, 11 MMcf. Approved Sept. 21.

UNION GAS & ELECTRIC CO., Bloomington, Ill. Docket G-1778. To furnish natural gas to Bloomington, Normal, Farmer City, LeRoy, Downs and adjacent areas, all in Illinois, 33 miles of 8-in. line from Piatt county to Bloomington, Ill., together with appurtenant equipment. Cost $892,136 ($133,214 additional to be spent on converting customer appliances for natural gas). Approved Sept. 24.

BROOKLYN (N. Y.) UNION GAS CO. Docket G-1615. For generation of electricity in Williamsburg power plant, New York City, a 3700-ft extension of the company's interstate transmission system. Cost $110,000. Approved Oct. 1.

CUMBERLAND & ALLEGHENY GAS CO., Pittsburgh. Docket G-1732. To increase deliveries and improve operations, 13 miles of line in various localities and retirement of same amount in West Virginia and Maryland. Cost $245,152. Approved Oct. 8.

HOME GAS CO., Pittsburgh. Docket G-1732, for 16 miles parelleling an existing line in Steuben and Chemung counties, N. Y. Cost $555,000. Approved Oct. 8.

MANUFACTURERS LIGHT & HEAT CO., Pittsburgh. Docket G-1732, for 26 miles in various localities, retirement of 18 miles and a 125-hp station, and conversion of three miles of transmission to distribution line in Pennsylvania and West Virginia. Cost $1,052,911. Approved Oct. 8.

CUMBERLAND & ALLEGHENY GAS CO., Pittsburgh. Docket G-1773. To gain greatest possible production from Garrett county, Md. and Terra Alta, W. Va. gas fields and improve service in Albright and Kingwood, W. Va., 45 miles of line in various sections of Maryland and West Virginia; two new compressor stations totaling 2080 hp; conversion of compressor station to two-stage operation. Cost $2,180,137. Approved Oct. 18.

MANUFACTURERS LIGHT & HEAT CO., Pittsburgh. Docket G-1773. 100 ft of line extending from terminus of Cumberland's authorized line to connection with existing line leading to Waynesburg, Pa. Cost $11,100. Approved Oct. 18.

IOWA-ILLINOIS GAS & ELECTRIC CO., Davenport, Iowa. Docket G-1721. To increase service to the Iowa City and Cedar Rapids areas, a 41-mile, 10-in. line paralleling line serving the areas. Cost $1,000,000. Approved Oct. 24.

CENTRAL KENTUCKY NATURAL GAS CO., Charleston, W. Va. Docket G-1648. To carry additional natural

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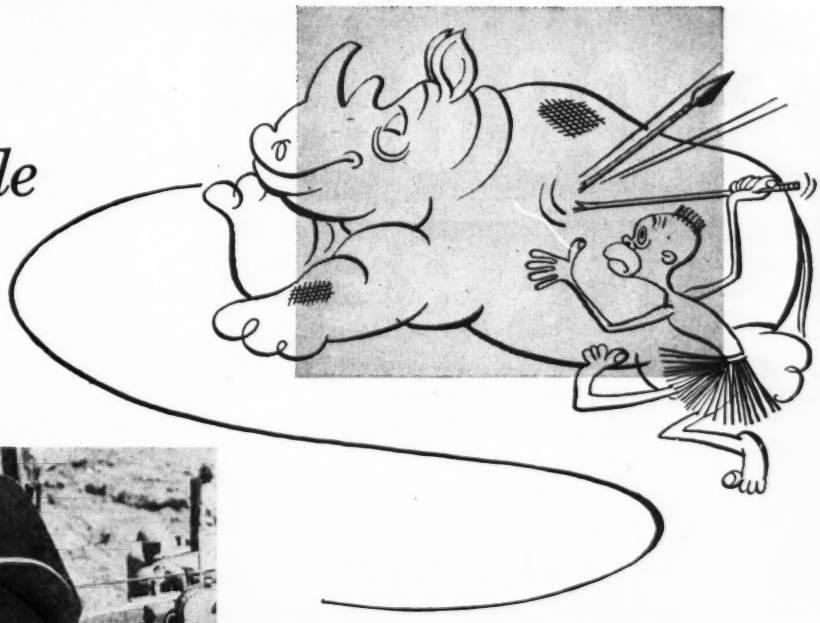

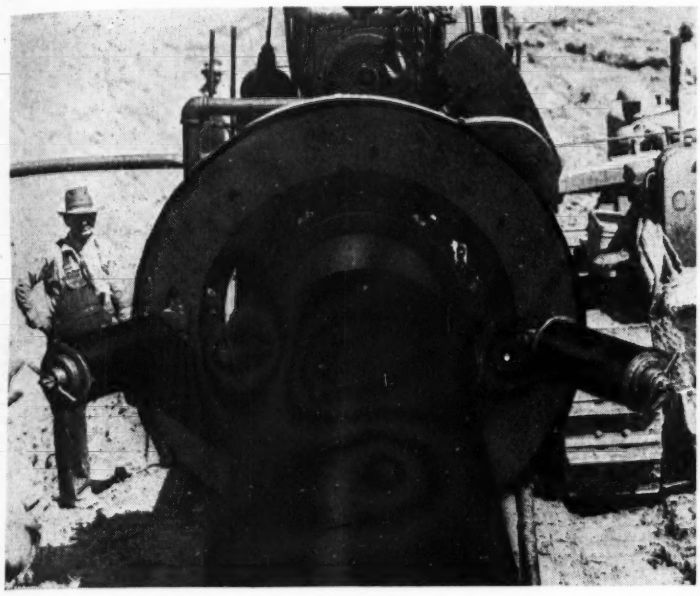

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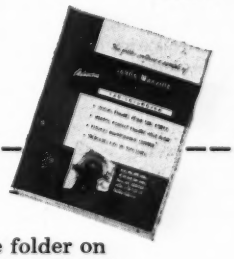

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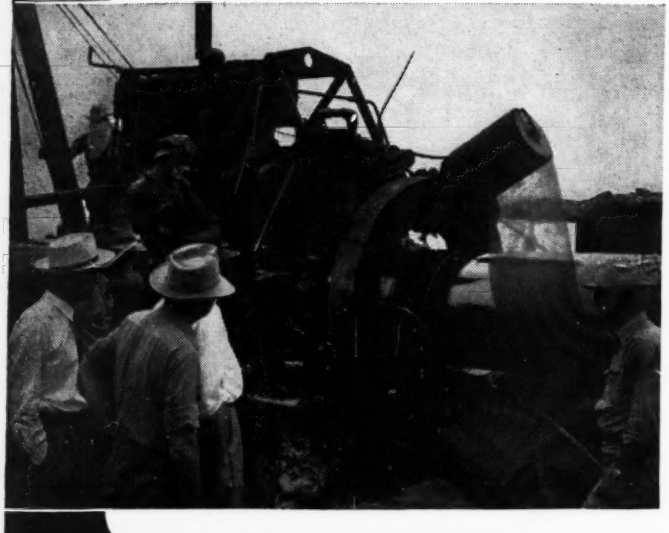

FROM MIDWESTERN

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MIDWESTERN ENGINE & EQUIPMENT CO., INC.

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gas to the Cincinnati, Ohio area, 13 miles of 20-in. line paralleling the company's existing 14-in. line extending northwestward from North Means, Ky. Capacity, 52 MMcf. Cost $780,000. Approved Oct. 24.

MICHIGAN GAS STORAGE CO., Jackson. Docket G-1600. For receipt, storage, and delivery of additional natural gas the company is to receive from Panhandle Eastern Pipe Line Co. for delivery to Consumers Power Co., 78 miles of 24-, 22-, and 16-in. line, and 17 miles of laterals in southeastern Michigan; 30 miles of 26-in. loop line and an additional 7400 hp at the Muskegon river compressor station. Cost $10,866,000. Approved Oct. 26.

CITIES SERVICE GAS CO. Docket G-1704. For development and utilization of two depleted gas fields in Kansas and to up maximum daily delivery by 120 MMcf for firm service in Kansas City, replacement of 10 miles of double 16-in. lines with a single 26-in. line between the Welda and Ottawa compressor stations in Franklin county, Kan. Cost $3,471,627. Approved Oct. 29.

TEXAS GAS TRANSMISSION CORP., Owensboro, Ky. Docket G-1578. To offset the company's present gas supply deficiency, 189 miles of 26-in. line from Arcadia parish to a connection with existing facilities in Morehouse parish, La. and construction of a metering and regulating station for the direct sale of 6 MMcf of natural per day to Mathieson Hydrocarbon Chemical Corp., Brandenburg, Ky. Cost $14,006,500. Approved Nov. 6.

SOUTHWESTERN VIRGINIA GAS TRANSMISSION CO., Martinsville. Docket G-1564. For distribution of natural gas in the Martinsville, Va. area, 17 miles of line from Transco's line near North Carolina-Virginia state line to Martinsville. Cost $220,378. Capacity, 500 Mcf. Approved Nov. 9.

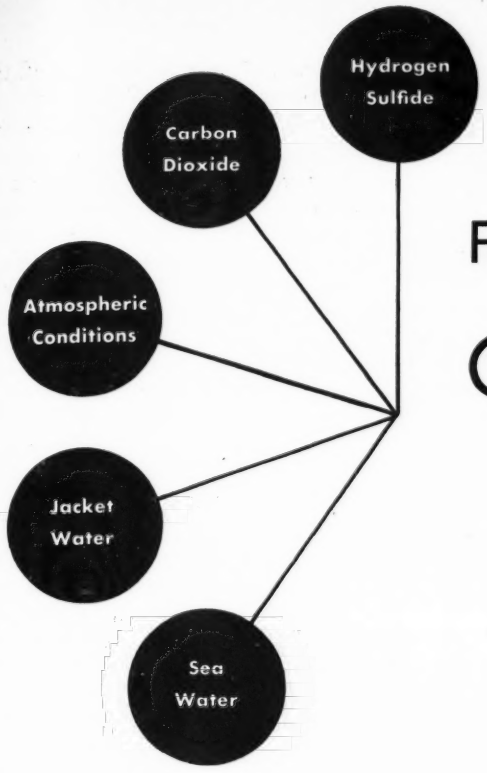
EL PASO NATURAL GAS CO. Dockets G-1629 and G-1345. To make available an additional 100 MMcf per day to present customers on its system in Texas, New Mexico, and Arizona, 10.4 miles of 30-in. loop line and an aggregate of 37,160 in new and existing main line compressor stations, and facilities to increase capacity to serve the Phoenix, Chandler City, and Mesa, Ariz. area by 67 MMcf per day. Cost $23,988,404. Approved Nov. 9.

KANSAS-NEBRASKA NATURAL GAS CO. INC., Phillipsburg, Kan. Docket G-1683. To meet increased demands as well as serve the new markets of Big Springs, Brule, Chappel, and Lodge Pole, Neb. and Ovid and Julesburg, Colo., 39 miles of various size lines; 24 miles of lateral lines and six town border stations, and 52 miles of 8⅝-in. line replacing 4½-in. line. Cost $976,330. Approved Nov. 14.

SOUTHERN CALIFORNIA GAS CO. Docket G-1698. To bring natural gas to the Antelope valley of southern California, a 38-mile line from a proposed connection with Pacific Gas & Electric Co.'s system near Mojave, Calif. Cities to be served include Mojave, Lancaster, and Palmdale, now served with liquefied petroleum gas, and Rosamond, which has no gas service. Cost $362,000. Approved Nov. 26.

PACIFIC GAS & ELECTRIC CO. Docket G-1753. A line tap and metering and regulating facilities on its line near Mojave, Calif. to deliver gas to Southern California Gas Co. in exchange for gas SoCal will deliver to Pacific Gas at its Kettleman Hills station. Cost $10,000. Approved Nov. 26.

SOUTHERN CALIFORNIA GAS CO. and SOUTHERN COUNTIES GAS CO., Los Angeles. Docket G-1743. To increase deliverability of gas withdrawn from the La Goleta, Calif. underground storage field, a 23.5-mile line from Inglewood to Los Angeles. Cost $2,611,875. Approved Dec. 12.



Frequent Causes of CORROSION In Gas Engines And Compressors

By A. K. HEGEMAN
Clark Bros. Co. Inc.
Huntington Park, Calif.

This article is adapted from a paper originally presented at the October annual meeting of the California Natural Gasoline Assn. While it therefore deals primarily with conditions in California, the problems are similar to those encountered in many other producing areas.

With the opening of deeper sands in the San Joaquin valley and the discovery of natural gas in the Venice and Santa Maria areas, the presence of corrosive compounds began to present a problem. When catalytic cracking was introduced in the state's refineries, compression of highly corrosive gases became a very serious consideration for both operators and compressor builders.

Mr. Hegeman discusses five types of corrosion and recommends methods of controlling them.

● Hydrogen Sulfide

OF all the corrosive compounds which occur in petroleum gases, the commonest and probably the most troublesome are hydrogen sulfide and carbon dioxide. Of these, hydrogen sulfide is the one which results in the most serious damage to equipment unless its presence is quickly recognized and proper steps are taken to combat its damaging action. In the compressor cylinder it corrodes all copper and copper-bearing alloy parts and even steel parts which are not protected from corrosion by a coating of oil. Its corrosive qualities appear to be enhanced by the presence of carbon dioxide, water, or oxygen.

The greatest expense to the operator is caused by the rapid deterioration of compressor valves unless the valves are either made of stainless steel or are properly protected from the corrosive gas by a coating of oil. Unfortunately, some of the stainless steels, such as 18-5, are inclined to warp and do not readily offer themselves for compressor valve operations. The corrosive qualities of hydrogen sulfide appear to increase with increased pressure and, at the very high pressures now prevalent in recycling operations, amounts which are practically undetectable in the laboratory will corrode compressor cylinders.

I believe this fact was first revealed when large recycling plants were placed in operation southwest of Bakersfield, Calif. Shortly after the first of these plants was started, the operators began to send badly corroded copper valve seat and valve cover gaskets to our warehouse. These gaskets were badly eaten away around the edges and of course were pitch black. Having seen similar gaskets removed from compressors in some of the refineries, I at once stated that hydrogen sulfide was present and that a gasket material other than copper should be used. Laboratory tests did not reveal the presence of any hydrogen sulfide. Nevertheless, aluminum and soft iron gaskets were substituted for the copper, and the loss of gaskets through corrosion immediately ceased.

Later on it was possible to collect some oily material which looked exactly like a mixture of carbon, dirt, and oil from some of the compressor cylinders. This material when burned gave off a very strong stench of sulfur, which conclusively proved that a very small amount of sulfur which could not be detected in the laboratory was actually present in the gas and became very active when the gas was subjected to a pressure of 3000 psi and a temperature of 300° F.

Because cylinder walls, pistons, piston rings, piston rods, rod packings, and discharge valves are usually well coated with lubricating oil, sulfide corrosion of these parts is very seldom encountered in compressor cylinders. However, if the gas being compressed is very high in sulfide content, it is advisable to use more lubricating oil than is generally considered good practice. The main difficulty in the compressor cylinders is with gaskets and intake valves. The gasket problem is easily solved by using soft iron or aluminum instead of copper or its alloys.

Protection of the intake valves is easily accomplished by injection of lubricating oil or gas oil into the gas stream just before it reaches the compressor cylinders. This oil coats the intake valves and protects them from the effects of the corrosive gas. When flushing oil is used for this purpose, it is probably advisable to use a heavier lubricating oil for the compressor cylinder than would ordinarily be used.

While hydrogen sulfide presents some problems in compressor cylinders, these are minor compared to the difficulty encountered when it is present in the engine fuel. Most engine builders frankly state that they cannot guarantee their engines to operate satisfactorily and without rapid deterioration if there are more than 20 grains per 100 cu ft of hydrogen sulfide present in the fuel.

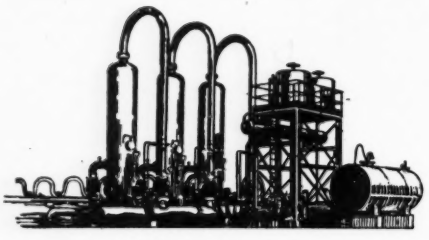
In the case of diesel engines, the permissible amount of sulfur, which is really the dangerous part of the hydrogen sulfide, is expressed in terms of allowable percentage by weight in the fuel oil, but this figure rather closely corresponds to the 20-grain limitation stated above. Whether it's a diesel, natural gas, L.P. gas, or gasoline engine, excessive sulfur in the fuel is exceedingly harmful.

Just what happens when sulfurous fuel is burned? When any mixture of hydrocarbons is used as a fuel in an internal combustion engine, the hydrogen combines with the oxygen from the air and forms water. Local gas forms about 13 gals. per Mcf burned. The greater part of this water is driven off into the exhaust where a considerable amount condenses in the exhaust manifold, piping, and muffler. Unless the jacket water is hot enough to keep the cooler parts of the power cylinders heated above the dew point of water, some of this water also condenses on the cylinder walls.

The sulfur in the fuel is oxidized to sulfur dioxide. That portion of the dioxide which passes off in the exhaust combines with any condensed water in the exhaust manifold, piping, and muffler and becomes sulfurous acid. More of the sulfur dioxide combines with the water which has condensed on the cylinder walls and likewise becomes an acid. Sulfurous acid is highly corrosive and immediately attacks the metal with which it is in contact.

Some of the sulfur dioxide and some of the sulfurous acid are swept into the crankcase where they act on the lubricating oil to form an acid sludge. The oil blackens up, thickens, and together with any portion of free acid which is left, attacks all of the metallic parts in the crankcase. Corrosion is very rapid and it is only a short time before the operator realizes that his engine is in very bad shape. When an engine which has been consuming sulfurous fuel is shut down and allowed to cool off, water condenses over the entire area of the cylinder walls and the walls of the exhaust manifold and piping, and corrosion proceeds at a rapid rate until the acid has completely combined with the metals.

It is difficult to understand why so many technically trained men—chemists, chemical engineers, and mechanical engineers—fail to recognize the danger to which engines under their jurisdiction are exposed when sulfurous fuels are burned. From time to time I have heard it said by operators or potential operators of gas engines that certain people interested in the sale of engines have told them that their particular product will not be damaged if sulfurous fuel is used. My advice to



any buyer of such equipment is that he get a positive statement in black and white signed by an officer of the corporation supplying the equipment.

Some of the advocates of extremely hot water engine cooling point out that if water at around the boiling point is used to cool engines, deposition of water of combustion upon the cylinder walls will not occur. Therefore, the use of hot water for cooling purposes is by no means a complete cure for the trouble. The only 100% answer to the problem is to burn fuel which does not contain sulfur in any form, remembering that sulfur is the arch-enemy of any internal combustion engine.

● Carbon Dioxide

CARBON dioxide is also a cause of frequent difficulties in engines and compressors although, fortunately, it is not nearly as active and destructive as is hydrogen sulfide. Dry carbon dioxide can be compressed to very high pressures such as 3000 or 4000 psi without any difficulty in the compressor cylinders or attached piping, but the presence of water and/or oxygen does cause corrosive action which can become serious if not recognized and prevented by suitable means. The carbonic acid which is formed by the combination of water and carbon dioxide attacks carbon steel; on the compressor end of a machine, in connection with corrosion of the intake piping and of the intake valves, it is particularly dangerous.

The latter can be nicely protected by the use of flushing oil as discussed under "hydrogen sulfide." Corrosion of intake piping can be successfully counteracted by using stainless steel piping or by coating the interior of the carbon steel piping with paraffinic paint. It is also highly probable that injection of lubricating oil or flushing oil into the stream of gas approaching the compressor will protect the intake piping from corrosion.

Corrosion of discharge piping does not appear to be reported as frequently as that of intake piping, and it is highly probable that this is because of a protective coating of oil, the source of the oil naturally being the compressor cylinder. However, it is strongly advisable to aftercool the discharge gas immediately downstream from the compressor cylinder to a point below the dew point of the moisture and to trap off the carbonic acid at the aftercooler.

Because of the protective coating of oil on the power cylinders and pistons, carbon dioxide does not appear to have any recognizable effects upon those parts. However, it has been determined by laboratory work that much of the increase in the size of power cylinders, which is commonly called "cylinder wear," is the result of corrosion by organic acids instead of by abrasion as is usually thought. Naturally, when making such a statement, I am assuming that hydrogen sulfide and dirt do not exist in the fuel and that the cylinder is properly lubricated.

Carbonic acid plays its part in this corrosion along with more complex organic acids which are not generally recognized as being present. It is understood that this corrosion is more apparent when the cylinders are operated at comparatively low temperatures as a result of light loading and of cold jacket water. Its corrosive effects are therefore more serious on marine installations of internal combustion engines than in the usually heavily loaded compressor station in the petroleum industry.

However, even with heavily loaded engines there is one place where carbonic acid formed by the carbon dioxide in the exhaust gas does have very serious corrosive effects. This is in the exhaust piping of the engine. Even if no water is injected into the exhaust gas to cool the piping, water of combustion is always present. As the exhaust gases cool off, this water is condensed, combines with the carbon dioxide and, even when no hydrogen sulfide is present, badly corrodes the exhaust piping and mufflers. Many of those who operated compressor plants in the days when it was customary to inject water into the exhaust piping will remember the severe corrosion of that piping and of the mufflers, which was very apparent upon inspection. Even the lubricating oil which was blown into the exhaust system from the power cylinders did not appear to eliminate this corrosion.

● Atmospheric Conditions

PRIOR to the time when the spread of residential areas in California made the presence of noxious fumes in the atmosphere undesirable, many refineries discharged waste gases from their stacks. This procedure has since been discontinued in the public interest. Among these gases were sulfur dioxide and carbon dioxide which combined with atmospheric moisture to form acids. These acids attacked anything of a metallic nature with which they came in contact and were, therefore, a source of considerable mainte-

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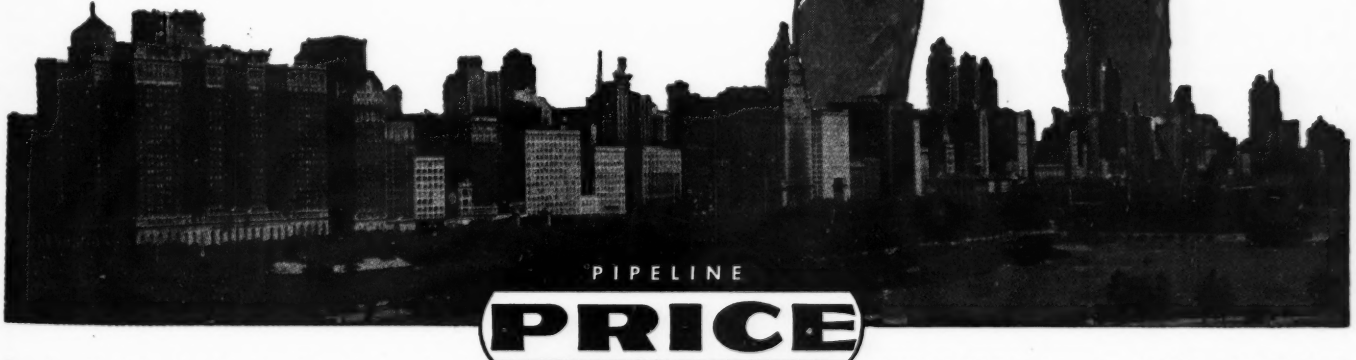
Congratulations to the Texas Illinois Natural Gas Pipeline Company on the inauguration of their new 30-inch line from Corpus Christi, Texas, to Joliet, Illinois. The Chicago area is now receiving almost double the gas supply than before the line was finished. H. C. Price Co. is proud to have had a part in this important pipe line achievement.



PIPELINE **PRICE** CONSTRUCTORS

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nance expense to the operators. Anecdotes describing two occurrences in California may be of interest and value.

After several months' operation in a catalytic cracking plant, certain engine-driven compressors were reported to the suppliers to appear to be incapable of further operation at full load. Investigation by the compressor company's representatives revealed that in the combustion air intake to the power cylinders there existed a vacuum of 30 in. of water instead of 5 in. of water, which had been logged when the plant was placed in operation.

Inspection of the air cleaners revealed that the oil compartment was filled with sticky acid sludge and that the filtering element consisting of crimped carbon steel wire was nothing but a solid mass of iron sulfite and rust. It was very apparent that the acid in the air which was drawn in at the air cleaner had combined with the oil and formed an acid sludge which of itself would seriously have interfered with proper operation of the air cleaner. In addition to this, the acid had attacked the steel and corroded it so badly as to seriously interfere with the supply of combustion air to the engines.

Operating results since the time that the air cleaners were replaced by another type not so subject to corrosion has been satisfactory enough to establish the fact that the amount of sulfur in the atmosphere is not sufficient to corrode the engines themselves. Since that time, the manufacturer whose cleaners were attacked by this acid has made changes in design and in material which make it possible for him to supply non-corrosive cleaners for locations where the atmosphere is saturated with sulfur dioxide.

The second case deals with the operation of some centrifugal air compressors in another refinery. The air at this location was also noticeably saturated with sulfur dioxide. The centrifugal compressor consisted of a first stage and a second stage case with an intercooler between them. It was compressing atmospheric air in two stages from 14.7 to 124.7 psia and the intermediate pressure was in the neighborhood of 45 psia. The operators were intercooling the air to approximately 70° F. This was well below the dew point of the moisture in the air and, naturally, with relative humidities running as high as 95%, large quantities of water were condensed between stages.

A few months after the compressor was placed in operation, a very noticeable decrease in capacity began to make itself felt. Inspection of the equipment revealed that the entire interior of the second stage case was coated with a crust of salt, in places as thick as 5/16 in., which naturally seriously interfered with performance. Chemical analysis of the salt deposit revealed that it contained sulfites of all the metals which, when alloyed together, form admiralty metal.

Inspection of the intercooler then revealed that the admiralty metal tubes had been seriously corroded by the acid which had formed as a combination of the sulfur dioxide and the water. I never heard any report about the aftercooler, but it is reasonable to assume that it was corroded in like manner.

There were two very apparent solutions in this difficulty, as follows:

1. Use stainless steel tubes in the coolers instead of alloys of copper. This solution had its drawbacks because of lack of a supply of stainless steel tubes of the required size.
2. Decrease the degree of intercooling, avoid cooling the interstage air below the dew point of the moisture contained therein, and thereby keep the acid in a vapor phase.

This second preventive method was adopted, since which time no further reports of difficulty have been received. However, it is very apparent that the second stage case now requires more power to operate than was formerly necessary.

● Jacket Water

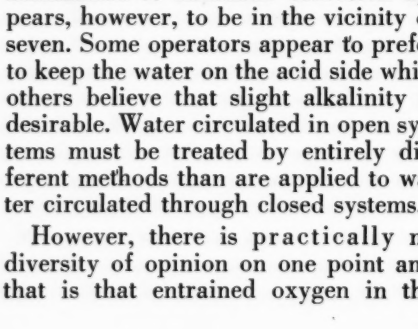
JACKET water corrosion is a type of corrosion which might more properly be discussed by a chemist than by a mechanical engineer. Several discussions of this type of corrosion with various individuals very definitely brought out that there is great diversity of opinion as to its causes and as to the proper procedure to eliminate it.

The pH at which the water should be maintained to minimize corrosion appears, however, to be in the vicinity of seven. Some operators appear to prefer to keep the water on the acid side while others believe that slight alkalinity is desirable. Water circulated in open systems must be treated by entirely different methods than are applied to water circulated through closed systems.

However, there is practically no diversity of opinion on one point and that is that entrained oxygen in the water is the cause of destructive corrosion of engine and compressor jackets. The attack of this oxygen upon the iron is very rapid. It results in a tubercular type of corrosion which, in turn, results in a deposition of nodules of iron oxide all over the jacket walls. The cure for this rapid and destructive type of corrosion has been very definitely established and is as follows:

1. Use a closed jacket water system wherein control of water quality can be closely maintained.
2. Add 2 lbs of sodium or potassium dichromate to each 1000 gals. of water in the system.
3. Titrate a sample of the jacket water weekly to maintain the proper concentration of dichromate.

The dichromate acts as an inhibitor against the tubercular type of oxidation of the iron. It does not entirely eliminate oxidation but it does slow down the activity of the oxygen. The resultant type of corrosion is much less rapid than when dichromate is not used and results in a smooth and non-tubercular deposit of iron oxide on the jacket walls.



● Sea Water

WHEN an organization builds an engine or compressor plant closely adjacent to the ocean, there is naturally some temptation to make use of the abundant supply of sea water to cool engines and compressors. The engineer who makes such a recommendation is headed for serious trouble. When sea water is heated to more than 100°, it becomes very corrosive and attacks the water jackets with astounding rapidity and persistence.

Discussion with several chemists reveals that the actual chemistry of this corrosion is somewhat obscure, although entrained oxygen in the sea water appears to be the corroding element. The results most certainly are not obscure. If large quantities of sea water at sea temperature are circulated through the jackets with a temperature rise of but 2 to 3°, corrosion will undoubtedly be negligible. However, the use of water at such low temperature will result in rapid power cylinder wear because of the deposition of water of combustion upon the cylinder walls.

It likewise will undoubtedly lead to considerable crankcase fouling with water. This is the practice generally used in small offshore fishing boats and it is a well known fact that wear of the cylinders on that type of craft proceeds at a rather rapid rate compared to the acceptable rate of wear of equipment such as is operated by the gas industry. It is strongly recommended that no thought be given to this type of cooling. No inhibitor is known.

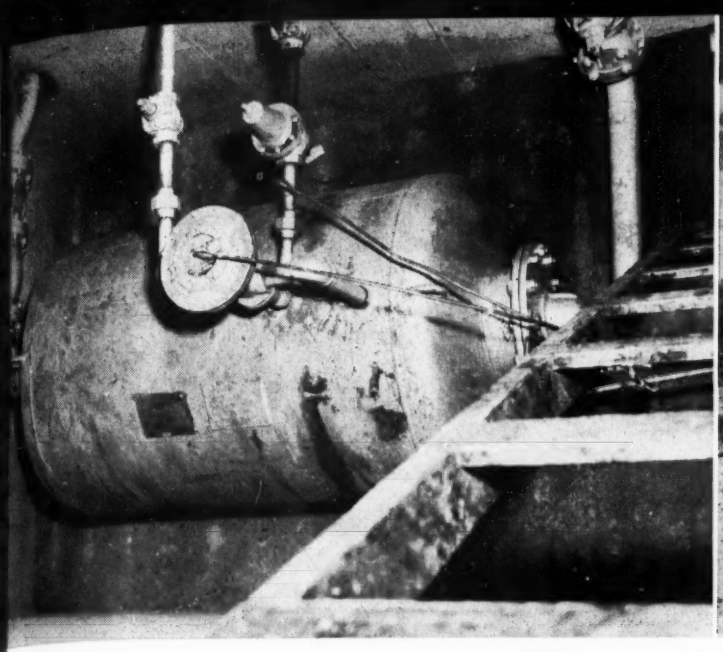


Fig. 1. Drip is collected in blowcases such as this at 57 points in low pressure system, flowing by gravity to low points through low pressure line and being pressured for uphill runs with high pressure gas.

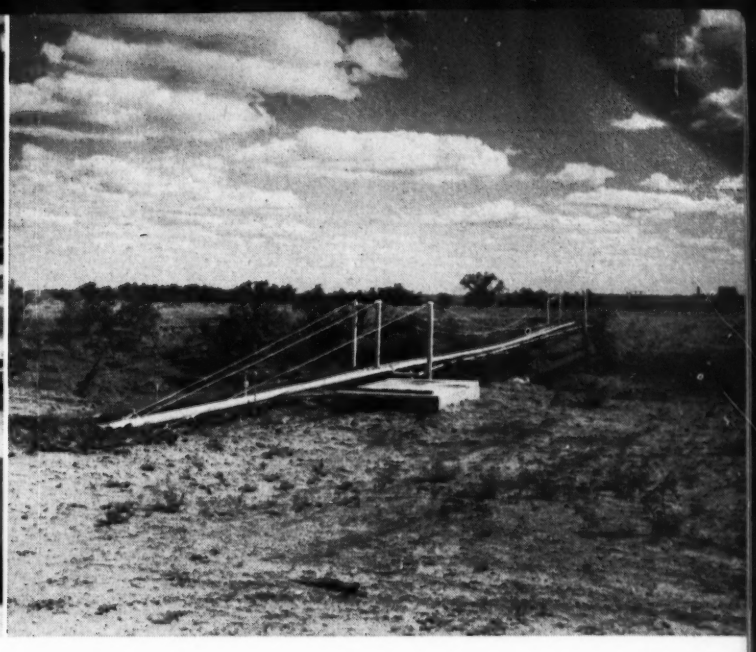


Fig. 2. Parallel low- and high-pressure lines in the Snyder gathering system. Larger diameter line is low pressure tube, through which drip is carried on downhill runs to blowcases.

Drip Collection Through a Low-Pressure System

● Condensate accumulation at Sunray's Snyder plant is handled as integral part of system

AT Sunray Oil Co.'s Snyder gasoline plant, in the Kelley-Snyder field in Scurry county, Texas, two complete and separate gas gathering systems are in operation. These systems gather casinghead gas from 840 wells located on 34,350 productive acres in the Canyon Reef lime.

Among several unusual features incorporated in the design of the facilities is an automatic drip collection system, which operates as an integral part of the low pressure system.

Due to the extreme richness of the low pressure gas, it was considered necessary to design a collection system to remove the condensate or drip gasoline as it accumulated in the gathering lines.

Elevation Survey

From a study of a survey of the elevations of the gathering system rights-of-way, it was found that 57 low points scattered throughout the system would require drips. To remove the drip gasoline by conventional methods such as a complete drip gathering system paralleling the low pressure line would require high investment and operating costs.

Therefore, a system was designed whereby the drip gasoline could be transported through the low pressure gathering lines to the plant. This was accomplished by installing slowup joints at the low point in the line to which specially designed blow cases were connected (*Fig. 1*).

As the liquid accumulates in the slowup joint, it flows into a 4-in. line through a check valve and into the blow case. The liquid flow into the blow case causes the sensitive float to rise. At a predetermined level the float trips a pilot control which in turn trips a three-way valve, allowing gas from the high pressure system, which parallels the low pressure system, to pressure the drip gasoline to the top of the next hill through a separate drip line. At this point the drip gasoline is put back into the low pressure system, where it flows by gravity into the next drip blow case at the next low point in the low pressure system.

As the level in the blow case falls, the pilot control closes, the three-way valve is reversed, and the gas under pressure is vented into the low pressure system. This procedure is followed at each successive drip, until the liquid reaches the drip installed just ahead of the plant intake header. The blow case at this point pressures the drip gasoline into a storage tank.

Pits required for the installation of the drip blow cases are 5 ft wide, 7 ft long and 8 ft deep, and the walls and floor are lined with reinforced concrete. Slots 12 in. long were formed in the concrete walls to provide for installation of the piping with enough room for movement of the piping in case of contraction or expansion of the gas gathering lines.

Automatic Operation

This system required about 23 miles of 2- and 3-in. pipe as compared to 70 miles of pipe required for a separate drip collection system. From an operating standpoint, this system is completely automatic, while if the drip truck method had been used it would have required at least two truck crews to collect the drip gasoline.

Fig. 2 shows the parallel low and high pressure lines.

Operation of the drip collection system was started in June 1951, and to date very few operating troubles have been experienced.

PIPELINE NEWS

Valve Turning at Joliet Marks Completion Of Third Major Line to Serve Chicago

At noon on Dec. 5 natural gas surged through Texas Illinois Natural Gas Pipe Line Co.'s 1417-mile line, marking the completing of the third large-diameter transmission line supplying the Chicago area. Turn-on ceremonies at Joliet, Ill., terminal point of the three lines, were attended by government, industrial, and civic leaders, and some 300 guests.

Construction of the line was completed in 15 months. FPC certification was granted on June 14, 1950 and ground was broken the following Aug. 29 at Wharton, Texas. From Falfurrias, Texas, deep in the gulf coast producing fields, a 195-mile, 26-in. section extends to Wharton. Then the 30-in. portion runs north to Joliet, with a 20-in. extension from there to Volo, Ill. to supply utilities serving areas north and northwest of Chicago.

The new system will be operated in close coordination with the established dual lines of Natural Gas Pipeline Co. of America. Together, the two firms operate a 4000-mile system. Both are affiliates of Peoples Gas Light & Coke Co., which serves all of Chicago. Board chairman of all three companies is James F. Oates. Joseph J. Hedrick is president and general manager of the pipeline companies, and Mark V. Burlingame is vice president in charge of operations.

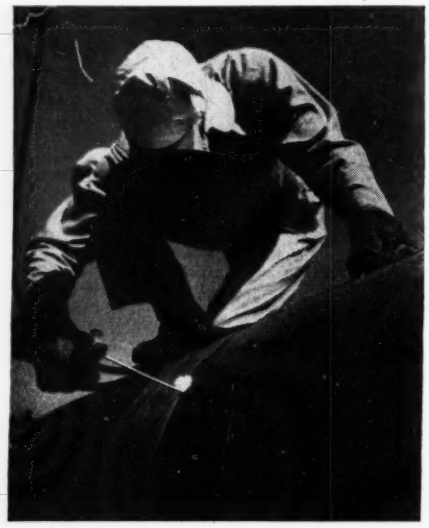
First Chicago Line

Twenty years ago—on Oct. 15, 1931—Natural Gas Pipeline completed and put into operation the first long-distance high pressure natural gas line to supply the Chicago area. It was a 24-in. tube extending from the Texas Panhandle field near Amarillo (and later from Hugoton field) to Joliet, and it is still in operation.

In January 1949 an interconnected parallel 26-in. line from the Amarillo area to Joliet was completed by Natural Gas Pipeline. Today, 510 MMcf daily flows through the two lines. Initial capacity of the Texas Illinois line is 374 MMcf daily, making combined capacity of the three lines more than 880 MMcf per day. The new line is designed so that its capacity can be increased to an ultimate 525 MMcf.

In Chicago, Peoples Gas distributes a mixed gas of 80% natural and 20% manufactured to its million customers. Other utilities receiving gas from the Texas Illinois line are Public Service Co. of Northern Illinois, Northern Indiana Public Service Co., and North Shore Gas Co. Among them, the four companies will take about 80% of the total volume transmitted by the new line.

Route of the Texas Illinois line parallels the gulf from a few miles southwest of Corpus Christi in Jim Wells county, Texas, to a point near Houston, where it swings north, passing near the Texas towns of Splendora, Lufkin, and Marshall to near Texarkana. Running from the southwest corner to almost the northeast corner of Arkansas, it cuts across southeast Missouri to cross the Mississippi river just below Cape Girardeau. After the Mississippi crossing, the line goes almost straight north through Illinois to its main terminal at the metering station near Joliet.



Welder wearing disc face shield crouches atop large-diameter Texas Illinois pipeline to complete multiple weld joining 40-ft steel sections as the last of the 1417-mile project was about to be lowered.

Severe weather conditions and defense production demands combined to impose unforeseen difficulties in construction of the $135 million Texas Illinois carrier, which runs through Texas, Arkansas, Missouri, and Illinois, crossing 456 creeks and rivers. Despite these obstacles, the project was completed on schedule and in time to serve its markets this winter.

Chief weather interruptions were caused by heavy rainfall throughout the construction zone during the spring and summer. The heavy precipitation swelled rivers and streams, and high water on the Mississippi caused a 2½-month delay in the construction of a submarine crossing at Grand Tower, Ill.

The Steel Situation

Obtaining the 500,000 tons of steel used (enough to manufacture 4,608,000 four-burner domestic gas ranges) proved to be a headache, too. Needed supplies were diverted to the defense production program, and some steel had to be procured in Belgium and Germany.

Six gulf coast gas fields situated between Houston and the Rio Grande valley will supply the volume needed for the line. The La Gloria field will provide 85 MMcf daily; Von Blucher field, 48 MMcf; Old Ocean field, 114 MMcf; Chocolate Bayou field, 28 MMcf; Hagist Ranch field, 45 MMcf; and Clayton-San Caja field, 30 MMcf.

About 200,000 40-ft sections of special welded steel pipe of six varying diameters were laid. Except where heavy-wall pipe was used for underwater stream crossings, pipe wall thickness is 11/32 in. One section of 30-in. pipe weighs slightly more than two tons. Some 375,000 tons of 30-in. pipe were installed in the system.

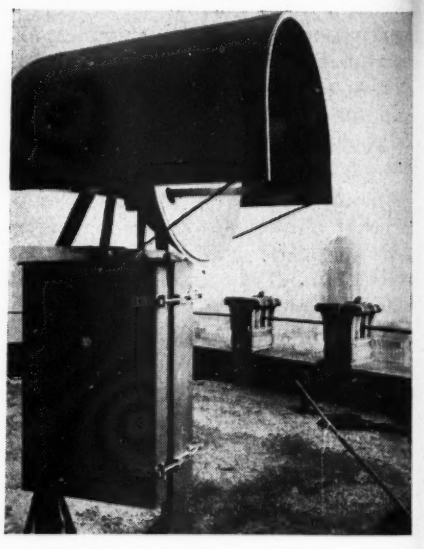
All phases of the line's construction required more than 5 million man-hours of work, the company estimated. As many as 2500 men were on the job at one time. All line construction was performed by three major builders: Midwestern Constructors Inc., Tulsa; H. C. Price Co., Bartlesville; and Bechtel Corp., San Francisco. They employed $12 million worth of construction equipment.

456 Rivers and Streams

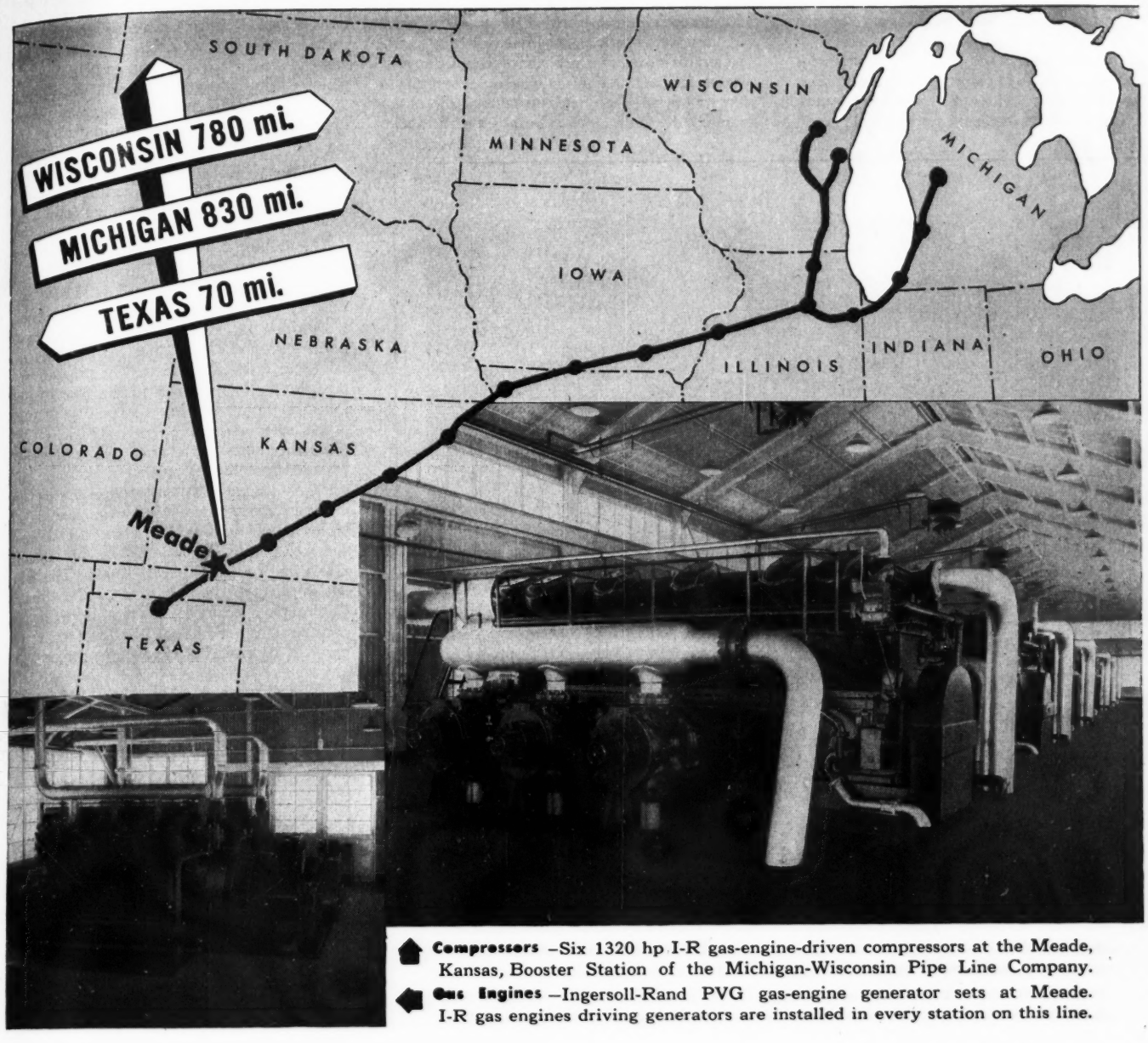
The 456 river and stream crossings were either specially designed steel suspension bridges or single or multiple submarine lines of thick-wall pipe. One line under the Arkansas river lies beneath a minimum of 18 ft of cover, and the other has a minimum cover of 23 ft. To overcome buoyancy, the heavy-wall pipe in these crossings weighs 267 lbs to the foot. More than 2.5 million cu yds of river bottom silt, rock, and soil were dredged from the Mississippi at Grand Tower, Ill. to make a 300-ft wide trench for the underwater crossing there.

In southwest Arkansas, pipeliners dubbed the Sulphur river " 'Gator Creek." Seven miles of swamp, infested with alligators and poisonous cottonmouth snakes, were negotiated by the crews during construction of the Sulphur crossing.

To keep the gas flowing through the system, five compressor stations were construct-



Northern terminal of the Texas Illinois microwave radio relay system overlooks the Chicago skyline. This network, which operates on the TV principle, furnishes voice communications from Hungerford, Texas to this terminal on the Illinois Civic Opera building. Mobile radio facilities are a part of it, and facilities are available for expansion to include teletype, remote controls, and more voice circuits.



Compressors –Six 1320 hp I-R gas-engine-driven compressors at the Meade, Kansas, Booster Station of the Michigan-Wisconsin Pipe Line Company.

Gas Engines –Ingersoll-Rand PVG gas-engine generator sets at Meade. I-R gas engines driving generators are installed in every station on this line.

BOOSTING GAS AT MEADE, KANSAS

for the Michigan-Wisconsin Pipe Line Co.

Annually, 110,000,000,000 cubic feet of natural gas pass through the 1500-mile Michigan-Wisconsin pipeline. In its long journey from Texas, the gas goes through sixteen Booster Stations before reaching millions of ultimate users in the Lake Michigan region.

Typical of these Booster Stations is the No. 1 Station at Meade, Kansas, shown above. Here the Michigan-Wisconsin Pipe Line Company has installed six 1320 hp Ingersoll-Rand KVG gas-engine-driven compressors, and two 370 hp PVG gas engines. In five other stations you will find similar Ingersoll-Rand engine and compressor installations.

The Ingersoll-Rand KVG gas-engine-driven compressor is a 4-cycle V-angle unit built in 660-, 880-, 1100- and 1360-hp. Its conservative rating and 4-cycle flexibility, its economy and reliability, make it a natural for installations wherever gas is available as a fuel.

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ed at Conroe and Marshall, Texas; Malvern and Pocahontas, Ark; and Hoffman, Ill. Each constitutes a modern community with its own housing facilities for employees, paved streets, utilities, and assembly center.

Gas-powered internal combustion engines, five to each station, furnish the total 50,000 hp necessary for initial operation. Auxiliary generator units, two per station, are Cooper-Bessemer 600-hp engines driving generators. Provision has been made to expand the output of each station and to build six additional ones as capacity expansion may require. Ultimate capacity, with a total of 154,000 hp installed, would require that each of the additional stations be equipped with seven 2000-hp units and that two main power units be added to the five now in place in the existing stations.

For efficient communication, microwave facilities have been installed along 1000 miles of the line. All key points from Chicago to Wharton and Houston have access to the system.

Output of the Texas Illinois line, which will augment the 510 MMcf daily now carried by Natural Gas Pipeline's dual lines, is destined largely for the Chicago metropolitan area. Last summer Peoples Gas received Illinois Commerce Commission authority to offer gas heat to the first 10,000 families on its waiting list and to 20,000 others early in 1952.

Further steps to eliminate the waiting list depend upon development of seasonal gas storage facilities. Permission to develop an underground storage area near Kankakee, Ill. has been requested by Natural Gas Storage Co. of Illinois, an affiliate of Natural Gas Pipeline and Texas Illinois. The firm has applied to the FPC and to the Illinois Commerce Commission. If the project is successful, more than 90 billion cu ft of gas will be stored during the summer.

Fig. 1. Welders use electric machine driven by power takeoff from jeep.

Jeep Becomes Mobile Welding Shop

Fig. 2. Closeup of jeep, showing electric welding machine. Acetylene equipment was installed by the company.

Fig. 3. Rear view shows oxygen and acetylene tanks, as well as special seat for welder's helper.

A welder's dream come true is one of the latest additions to the motor fleet of the Pittsburgh Group companies in the Columbia Gas System.

This is a converted jeep *(Fig. 1)* which is a veritable traveling weld shop, with complete equipment for acetylene cutting and welding, plus a 200-ampere GE electric welding machine driven by a power takeoff from the motor.

When purchased, the jeep was equipped with the electric welding machine *(Fig. 2)*. Acetylene welding equipment was installed in the Moundsville garage of the Natural Gas Co. of West Virginia, under the supervision of Foreman Frank Weinzierl. He also developed the equipment for fastening the oxygen and acetylene tanks at the rear of the jeep. An additional convenience feature is the seat located just behind the electric welder, in which the welder's helper can ride safely from job to job *(Fig. 3)*.

Before the development of this jeep, the two cylinders and welder's tools for acetylene welding had to be pushed along the highway on small two-wheeled carts. Where there were no roads on which to push the carts, the heavy tanks had to be carried.

At that time, the only electric welders in the gas company's distribution setup were the two-wheel trailer type. These had to be towed through fields and along the rights-of-way by distribution department automotive equipment.

The sturdy, four-wheel-drive jeep gets around under almost any type of road conditions or along the rights-of-way through rural areas where maintenance and repair jobs are to be done.

Reciprocity Suggested As Alberta Export Solution

An agreement calling for reciprocal exchange of natural gas between the U. S. and Alberta was proposed by R. R. Herring of Houston, vice president of Prairie Pipelines Ltd., speaking before the Alberta Petroleum and Natural Gas Conservation Board during hearings on six applications for permits to export the province's gas.

Under the plan, 200 MMcf daily would flow into the Pacific Northwest from Alberta and, in exchange, 250 MMcf from the Texas area would be delivered at Windsor, Ont. for distribution in Ontario and Quebec. Consumers in the two provinces would save an estimated $5 million a year (based on annual use of 80 trillion cu ft annually), Mr. Herring stated.

Cost of the project to export Alberta gas to the Pacific Northwest was set at $85,528,000, and distributors would receive it at 33 to 34 cents per Mcf, it was estimated.

The offer was made subject to the drafting of a treaty between the two governments for such transportation and sale of gas for a period of not less than 20 years, and to FPC authorization.

Texas-Ohio Financing Set

Texas-Ohio Gas Co., Houston, recently announced an arrangement with Kidder, Peabody & Co. to handle financing of a proposed 1350-mile, 30-in. line from the Rio Grande valley to West Virginia, at a cost of approximately $185 million.

Formed last May, Texas-Ohio filed an application in October with the FPC for authority to build the line. A hearing will be held during the next 90 days. With commission approval, financing and construction will begin shortly threafter, presumably the middle of 1952.

Six Requests for Columbia Gas Considered Again

Scheduled to start Jan. 9 are further hearings on six natural gas applications in which all the applicants propose to obtain their supplies from subsidiaries of the Columbia Gas System. The Federal Power Commission stated that facts relating to the gas requirements and gas supply situation of the Columbia system "have so changed since the hearing herein as to make it appropriate to reopen these proceedings."

New River Gas Co., Radford, Va., wants to build a line to serve five Virginia cities and is seeking gas from Atlantic Seaboard Corp.; Warwick Gas Corp., Florida, N. Y., and Crystal City Gas Co., Corning, N. Y., want FPC to direct Home Gas Co. to supply them; Citizens Gas Co., Stroudsburg, Pa. and Bangor (Pa.) Gas Co., are seeking gas from Manufacturers Light & Heat Co.; and Pen Argyl (Pa.) Gas Co. would get gas indirectly from Manufacturers through a connection with Bangor's system.

Aboveground Gas Trade Arranged in Southwest

A transaction believed to be without precedent in the natural gas industry involves two major gas production companies, Humble Oil & Refining Co., Houston, a subsidiary of Standard Oil Co. of N. J., and Southern Production Co., Shreveport, who recently completed a $100 million agreement for the exchange of natural gas from fields in Louisiana and Texas.

Under the 20-year agreement, Humble Oil will deliver to Southern Production 75 MMcf of gas daily from its Duck Lake and Lake Sand fields in Louisiana and, in turn, Southern will supply Humble with a like volume from the Pledger field in Brazoria and Matagorda counties in Texas, involving in excess of 700 billion cu ft of gas.

Purpose of the two-way transfer, unique because it calls for aboveground exchange of gas rather than underground, is to provide suitable outlets for each company's gas fields at locations more convenient to existing pipeline facilities.

FPC Okays 117-Mile Project

FPC certification has been granted Kansas-Nebraska Natural Gas Co., Phillipsburg, Kan., for facilities to up daily capacity 18.4 MMcf in order to meet increased demands of existing markets and to serve new markets in Nebraska and Colorado.

The construction program includes 117 miles of line ranging in size from 2⅜-in. to 8⅝-in. together with necessary lateral lines, measuring, and regulating equipment and will cost an estimated $976,330. The company also plans to spend an additional $202,000 on the construction of distribution systems.

New markets to be served through the facilities include Big Springs, Brule, Chappell, and Lodge Pole, Neb., and Ovid and Julesburg, Colo., as well as two industrial customers and two municipal power plants at Julesburg and Chappell.

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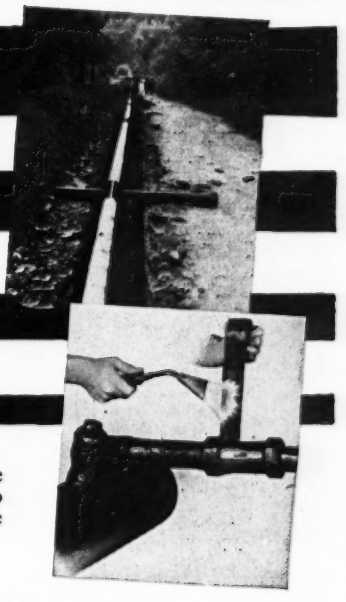

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Easternmost Major Natural Gas Source Producing Gas for Pittsburgh Area

Natural gas from Pennsylvania's Leidy field, easternmost source of major gas production so far discovered, is now flowing into the Pittsburgh area through the $11 million line started last April and completed in November by Manufacturers Light & Heat Co., a Columbia Gas System subsidiary. Valve-turning ceremonies were held Nov. 13 at Jeannette, Pa.

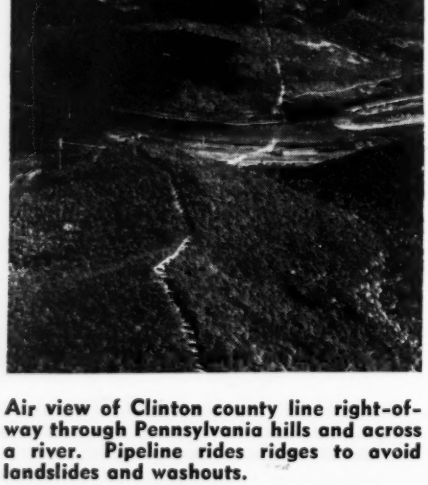
Stretching through 167 miles of mountainous terrain, the line consists of 140 miles of 16-in. pipe, 10 miles of 20-in., and 17 miles of 24-in. A 2640-hp compressor station and dehydration plant is being built at Gleasonton, near Leidy, at a cost of $790,000.

Five rivers were crossed: the Monongahela, Youghiogheny, Loyalhanna, Conemaugh, and the west branch of the Susquehanna. Originating 10 miles east of Renovo in Clinton county, the line connects with previously existing ones in Westmoreland, Allegheny, and Washington counties, and terminates near Canonsburg.

The first deep gas well at Leidy came in on Jan. 8, 1950. In order to take advantage of this promising gas supply, Manufacturers leased about 200,000 acres in north central Pennsylvania and has other acreage under contract to buy gas from companies developing it. In addition, the company receives 25 MMcf a day from Trans-Penn Transit Corp., which is also tapping the same general area.

Columbia Gas is currently drilling a test well on the Ferney Dome, 25 miles southeast of Leidy field, and plans to drill many others. As of Oct. 12, 1951, a total open flow of 595,943 Mcf daily had been developed from 55 productive wells. At that time, 48 more wells were being drilled, and 14 additional locations had been made.

Interests supplying the Clinton county line have developed 18 productive wells with a total open flow of 188,025 Mcf daily. They are drilling 43 others and have made 13 locations in the field.



Air view of Clinton county line right-of-way through Pennsylvania hills and across a river. Pipeline rides ridges to avoid landslides and washouts.

Map of Columbia Gas System showing location of Leidy gas field and Manufacturers Light & Heat Co.'s recently completed Clinton county line.

SoCal-PG&E Antelope Valley Project Approved

Southern California Gas Co., Los Angeles, and Pacific Gas & Electric Co., San Francisco, have been granted FPC authority for construction of natural gas facilities to provide service in the Antelope valley of southern California.

SoCal will build a 38-mile line extending from a proposed connection with PG&E's system near Mojave, Calif. to bring natural gas to Mojave, Lancaster, and Palmdale, now served with liquid petroleum gas, and to Rosamond, which at present has no gas service. Estimated cost is $362,000.

Pacific Gas was authorized to build (at an estimated cost of $10,000) a line tap and metering and regulating facilities on its line near Mojave, to deliver gas to SoCal in exchange for gas which the latter company will deliver to Pacific Gas at its Kettleman Hills, Calif. compressor station.

Hearings Begun on Seven Panhandle Applications

A public hearing began Dec. 13 on seven applications by Panhandle Eastern Pipe Line Co., Kansas City, Mo. They include a disclaimer of jurisdiction, or in the alternative, authority to construct facilities and/or the rendering of natural gas service on an interruptible or dump sales basis to certain customers in Missouri and Illinois.

Panhandle also seeks permission to abandon service to Gas Service Co., Kansas City, Mo., stating that 97% of the gas purchased and distributed by Gas Service is obtained from its affiliate, Cities Service Gas Co., and since that company's lines pass through or near most of the communities served by Gas Service, it is illogical and contrary to public interest for Panhandle to furnish any gas.

Another application includes a Panhandle request for an FPC order requiring Central Indiana Gas Co., Muncie, to cease violating filed rate schedules, and permitting Panhandle to abandon service to Central Indiana in event they fail to comply with curtailment orders. The final proceedings involve a complaint by Central Indiana charging Panhandle with violation of Section 4(b) of the Natural Gas Act, with respect to transportation and sale of natural gas causing undue prejudice and disadvantage to Central Indiana and the public it serves.

United Properties Will Change Hands Twice

Hearings on two applications involving the sale of United Gas Pipe Line Co.'s (Shreveport) North Texas division and Wichita Falls district compressor station facilities and 678 miles of pipeline in Texas and Oklahoma began Dec. 10 in Washington.

In one application, United is seeking authority to sell the facilities. The other, filed by Martin Wunderlich, Omaha, and Lee Aiken, Corpus Christi, (see *GAS*, Nov., p. 116) requests permission to acquire and operate the properties. Capital cost is estimated at $5 million.

Just before the FPC hearing got under way, Lone Star Gas Co., Dallas, entered the picture with an announcement that it has signed a contract with Wunderlich-Aiken for the purchase of the Wichita Falls district properties of United for $5.5 million.

Lone Star has agreed that when Wunderlich and Aiken have acquired the properties, it will assist them by supplying extra gas to meet 1951-52 requirements. The sale to the Dallas utility is expected to be completed by next summer.

Jan. 28 Hearing Set On Transco Proceedings

A consolidated hearing on applications of Transcontinental Gas Pipe Line Corp., Houston, and three subsidiaries of Columbia Gas System Inc. involving gas supplies on their respective systems has been set by FPC to begin Jan. 28 in Washington.

The Columbia subsidiaries are Atlantic Seaboard Corp. and United Fuel Gas Co., both of Charleston, W. Va., and Manufacturers Light & Heat Co., Pittsburgh. Atlantic wants to build connections with Transco's system at Rockville and Endicott City, Md. and to sell gas to Pittsburgh & West Virginia Gas Co., Pittsburgh.

United would exchange natural gas with Transco, and Manufacturers is seeking authorization to build an interconnection with Transco's system in Chester county, Pa. and to acquire about 170 ft of line and a meter station from the latter company.

Transco is also asking permission to sell gas to United and Manufacturers. The third proceeding relates to disposition of 64 MMcf of natural which Transco was to sell to Northeastern Gas Transmission Co. for distribution in New England. Deliveries were to begin Sept. 1, 1951 but Transco recently terminated the contract and is asking for a new one providing for deliveries to begin Sept. 1, 1953.

Texas Gas Applies Again

To supply additional gas to present market areas, FPC permission is being sought by Texas Gas Transmission Corp., Owensboro, to construct facilities substantially the same as those denied by the commission's opinion and order issued Nov. 6 (see *GAS*, December, p. 106). The only material changes in the new application are elimination of the sale proposed to the Tennessee Valley Authority and substitution of an interruptible sale of up to 45 MMcf per day to Ohio Fuel Gas Co., Columbus.

In lieu of the 404 miles of 26-in. partial loop line, the company is now seeking authority to build 407 miles of the same size pipe with installation of 26,860 hp instead of the 17,260 hp previously proposed. Total cost of construction is estimated at $33,752,705.

Los Angeles Line Okayed

FPC authorization has been granted Southern California Gas Co. and Southern Counties Gas Co., Los Angeles, for construction and operation of a 23.5-mile 30-in. line from Inglewood to Los Angeles, Calif., with the two companies jointly owning one-half of the line, the other half being owned solely by SoCal. Construction cost to Southern California is estimated at $2,288,169 and to Southern Counties, $323,706.

In addition, the commission authorized the companies to jointly operate an existing 15-mile section of 30-in. line extending from Rivera Junction to Inglewood, Calif., and SoCal was authorized to operate an existing 3.9-mile section of 18-in. line in Los Angeles. Primary purpose of the facilities is for movement of intrastate gas during the winter season.

Trojan to Build Two Lines

Oklahoma Natural Gas Co., Tulsa, has let to Trojan Construction Co. a contract for laying 23 miles of 24-in. welded line from the company's Depew underground storage area to its junction at Kellyville compressor station. The line will provide more gas for Tulsa, Muskogee, and Okmulgee.

Upon completion of the project, Trojan will proceed with a 14-mile stretch of 8-in. from Shamrock to Cushing, which will bolster gas supplies in the Cushing-Stillwater-Pawnee area, adding a second source to the present line from Guthrie.

Cost of the two lines will exceed $1.5 million.

Rockland Light Applies

On Jan. 9, FPC will begin a hearing on the application of Rockland Light & Power Co., Nyack, N. Y. requesting authority to build 22 miles of natural gas transmission line from Orangetown to Tomkins Cove, N. Y. Estimated to cost $75,315, the line would have a daily capacity of approximately 11 MMcf.

Rockland is also seeking a commission order directing Transcontinental Gas Pipe Line Corp., Houston, to establish a connection with the proposed line at Orangetown and to furnish a supply of natural to meet requirements of Rockland's eastern division, including Nyack, South Nyack, Grand View on Hudson, Piermont, and parts of Orangetown and Clarkstown.

El Paso Decision Affirmed

Upholding the initial decision of Samuel W. Jensch, presiding examiner, FPC has issued an order (*GAS*, December, p. 109) authorizing two El Paso Natural Gas Co. projects.

The first, estimated to cost $22,950,000, includes 10.4 miles of 30-in. main line loop and 37,160 hp in new and existing compressor stations, making available an additional 100 MMcf daily to present customers in Texas, New Mexico, and Arizona.

The second project will increase capacity of facilities to serve Phoenix, Chandler City, and Mesa, Ariz. by 67 MMcf daily at a cost of $1,038,404. Temporary authorization for these projects was granted in October 1950.

Glass Fibers Buys Firm

Glass Fibers Inc., Toledo, has purchased controlling interest in the Vibradamp Corp. with headquarters in Los Angeles and plant facilities there and at Santa Clara, Calif.

The acquired company uses lightweight glass wool, a product of Glass Fibers, in the manufacture of shock and vibration mounts and other products for defense

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weapons, in addition to a number of commercial applications. They are sold under the trade name "Vibraglass."

Texas Gas Subsidiaries Ask to Operate Lines

Texas Northern Gas Corp. and Louisiana Natural Gas Corp. of St. Charles, La., subsidiaries of Texas Gas Transmission Corp., Owensboro, have filed applications with the Federal Power Commission for authority to operate approximately 203 miles of pipeline in Louisiana to make natural gas deliveries to their parent company in the North Tepetate, La. gas field.

The applications were filed to comply with a commission order issued Nov. 9 authorizing Texas Gas to build a 189-mile pipeline in Louisiana, with the condition that the new facilities could not be used for transportation or sale of gas unless the two subsidiaries filed for FPC authorization for their facilities.

Texas Gas proposes to purchase up to 46.8 MMcf of natural per day from Texas Northern and up to 93.2 MMcf per day from Louisiana Natural.

TGT Withdrawal Granted

The Federal Power Commission has granted a motion by Tennessee Gas Transmission Co., Houston, for withdrawal of its application seeking authority to increase its system capacity by 115 MMcf per day for delivery to markets in Ontario, Canada, without prejudice to Tennessee's filing at a later date an application for authority to build facilities to accomplish the same or similar purposes.

The proposed construction, estimated to cost $47,403,000, included a line extending from Buffalo, N. Y. to a point on the U. S. Canadian border near Niagara Falls. Tennessee stated that the company is not prepared at this time to submit the exhibits required under FPC rules.

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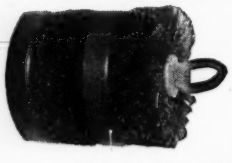
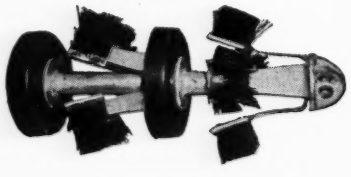
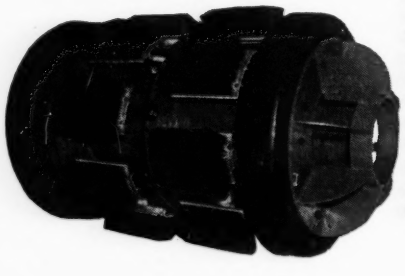


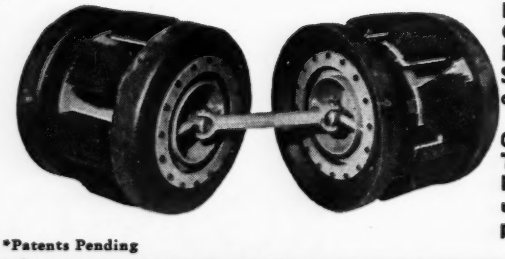
4" Size—TYPE JRN. 2" to 4" sizes. Will pass 1½ R-90° Bends. No valves other than full diameter thru port valves. Use TYPE SCN-51 for 6" size.



8" Size - TYPE WC-11. 8" to 14". Will traverse 6-foot radius field bends, full diameter side openings at 45°. SPRINGS COMPENSATE for BRUSH WEAR.



20" Size - TYPE GP-2. 16" to 30" 200-lb. SPRING forces the brushes against pipe wall — COMPENSATING for WEAR. Will traverse round opening gate or plug valves. SPRINGS and BRUSHES are identical and interchangeable for all types and sizes of GP-PIGS.



24" Size - GP-3. 18" to 30". Sizes will pass 1½ R-30° Bends. SPRINGS COMPENSATE for BRUSH WEAR ASSURING full section cleaning efficiency.

GP-3 consists of two Type GP-1 Pigs—Each Unit may be used as individual pig.

*Patents Pending

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West Texas Plans Project To Up Capacity 24 MMcf

West Texas Gas Co., Lubbock, has asked FPC permission to build approximately 32.5 miles of pipeline, to make compressor station additions totaling 2010 hp on its system in Randall and Potter counties, Texas, and to salvage 25 miles of existing lines, to be laid as a loop to an existing line south of the McSpadden compressor station in Randall county. The facilities, estimated to cost $1,636,145, would up capacity 24 MMcf per day, providing a total daily capacity of 135 MMcf.

Scheduled to start Jan. 16 are consolidated proceedings involving applications of West Texas, Southern Union Gas Co., Dallas, and El Paso Natural Gas Co. Southern Union would increase deliveries in the Clovis, N. M. area, and El Paso would reduce deliveries to Southern Union's supplier, West Texas Gas. Previously scheduled for Dec. 12, the postponement was requested by counsel for the latter company.

Master Tank Adds Top Roll

Master Tank & Welding Co., fabricator of high-test expanded line pipe for the gas industry, has recently installed in its Dallas plant a new smaller diameter top roll which will enable the firm, according to C. L. Young, assistant manager, to roll 20-in. pipe instead of pressing it.

A Berkley mill has also been added to the welding line, bringing the total to 13 submerged arc welders. A jib crane which will handle four lengths of pipe at a time, thus speeding up the loading of pipe, has also been installed.

Sam Weempe is president of Master Tank & Welding.

California Gas Dwindling

Last month the California Public Utilities Commission expressed concern over the state's natural gas supply and predicted that a future shortage is possible unless more out-of-state gas is imported. The conclusion was reached following a survey involving public hearings held by Harold P. Huls, commissioner, and Manley Edwards, examiner.

At present the state obtains more than one-third of its current gas needs from Texas and New Mexico. California utilities' plans for obtaining additional out-of-state supplies were declared sound. For 1952, the supply within the state looks greater than firm requirements, but in 1953 it will be necessary to seek out-of-state help.

United Asks 11-Mile Line

United Gas Pipe Line Co., Shreveport, has applied to the Federal Power Commission for permission to construct an 11.3-mile pipeline in Terrebonne parish, La. to obtain natural gas from two additional fields.

The proposed 20-in. line, estimated to cost $1,461,000, would connect with the company's 24-in. line now under construction in Terrebonne parish, extending southwesterly to the Turtle Bayou and Kent Bayou gas fields. The line would have a capacity of 143 MMcf of natural per day.

Estimated reserves of the two fields total approximately 490 billion cu ft.

Newsnotes

To provide capacity to meet estimated maximum day requirements during the 1952-53 winter, Atlantic Seaboard Corp., Charleston, has applied to the Federal Power Commission for authority to construct and operate a total of 18,200 hp on its 26-in. main transmission line at four proposed new compressor stations, and to install an additional 1100-hp unit at an existing station, all in West Virginia. Estimated to cost $8,462,000, the proposed facilities would supply an additional 89.5 MMcf on peak days.

Gulf-Michigan Gas Transmission Corp., St. Louis, has indefinitely postponed plans for construction of a 780-mile natural gas pipeline from Louisiana to Michigan City, Ind. by way of St. Louis, because of the scarcity of steel, the high cost of equity capital needed to finance construction of the line, and inability to obtain firm allocations to guarantee its completion. The $90 million project was to have gone into operation by late 1952.

Properties of H. L. Rowley Inc., Shreveport, at Farmington, N. M. have been sold to El Paso Natural Gas Co. Consisting of the yard and office, one rotary rig, and one cable tool rig, they were formerly operated under the name of Big Chief Western Drilling Co. In addition, Rowley farmed out to El Paso 2300 acres of proven acreage in San Juan county with the agreement that the firm is to drill 14 gas wells within the next year.

Final authorization was granted by FPC Nov. 27 to Iowa-Illinois Gas & Electric Co., Davenport, for construction of a 41-mile line paralleling an existing lateral now serving the Iowa City and Cedar Rapids districts. Estimated capacity of the new line is 1540 Mcf per hour and it will double Iowa-Illinois' capacity to serve the two districts. Cost is set at $1 million.

T. D. Williamson Inc., Tulsa, announced the appointment, effective Dec. 1, of Canadian Equipment Sales & Service Co. of Edmonton and Toronto as its exclusive agent in Canada.

PROGRESS REPORTS

Planned

AMERE GAS UTILITIES CO., Charleston, W. Va. Docket G-1716 for 33.6 miles of line in West Virginia.

ARKANSAS-LOUISIANA GAS CO., Shreveport, for 16 miles 8⅝-in. line from Haynesville, La. to Magnolia, Ark.

ARKANSAS-MISSOURI POWER CO., Blytheville, Ark. To build line from Big Inch to serve 12 towns in two states. Construction scheduled for 1952.

ATLANTIC SEABOARD CORP., Charleston, Docket G-1850 for four new compressor stations aggregating 18,200 hp, with additional 1100 hp unit to be installed in existing station, all in West Virginia.

CENTRAL WEST UTILITY CO., Kansas City, Docket G-1682, four alternate plans to serve Clay county, Mo.

CHICAGO DISTRICT PIPELINE CO., Joliet, Docket G-1756 to build 15 mile, 30-in. line in Cook county, Ill.

EAST TENNESSEE NATURAL GAS CO., Knoxville. Docket G-1336 for a 100-mile, 16-in. line from near Knoxville to Kingsport, Tenn. with appurtenant equipment.

EL PASO NATURAL GAS CO. Docket G-1631 for 112.9 miles 30-in., 179.5 miles field lines, 98,200 hp added capacity plus 36,540 hp in field stations, field gathering systems, and miscellaneous facilities.

EL PASO NATURAL GAS CO. Docket G-1630 for

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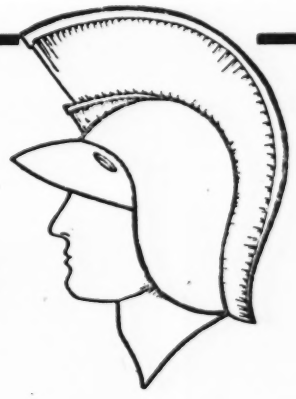

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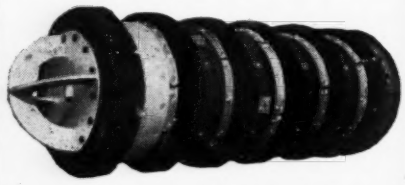

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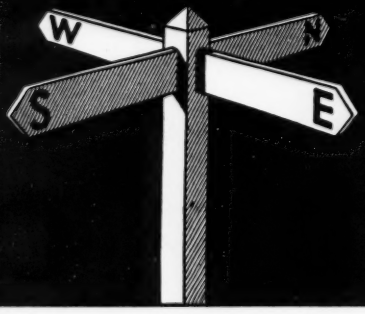


PIPELINE COATINGS and WRAPPING MATERIALS

S. D. DAY COMPANY

1973 WEST GRAY HOUSTON, TEXAS PHONE JU-2431

25,050 hp at new and existing stations, 50.9 miles field lines, 2700 hp at a field plant, gas wells and miscellaneous facilities.

GLACIER GAS CO., Butte, Mont. Dockets G-1816, G-1817, G-1818 for 285 miles of 20-in. from northeast of Kalispell, Mont. to Spokane, Wash.; 91 miles of 8⅝-in. from Spokane to Lewiston, Idaho; 120 miles of 16-in. from Spokane to Hanford, Wash.; 130 miles of 12¾-in. from Spokane to south of Trail, B. C.

GULF-MICHIGAN GAS TRANSMISSION CORP., St. Louis, for 680-mile, 30-in. line from Perryville, La. to St. John, Ind. with three compressor stations totaling 30,800 hp. Project postponed indefinitely because of scarcity of pipe.

MIDSOUTH GAS CO., Little Rock, Ark. Dockets G-1445 and 1680 for 240 miles of line in Greene, Crittenden, St. Francis, Lee, Phillips, Monroe, Woodruff, Poinsett, and Cross counties, Ark.

MISSOURI CENTRAL NATURAL GAS CO., Macon, Mo. Docket G-1509 for 25 miles of 6-in. from Moberly to Macon, Mo.

NATURAL GAS STORAGE CO. OF ILLINOIS, Chicago. To build facilities to develop an underground storage area 15 miles from Kankakee, Ill.

NEW RIVER GAS CO., Radford, Va., 50-mile line from Atlantic Seaboard's system in W. Va. to a point near Radford with laterals to four towns.

NEW YORK STATE NATURAL GAS CORP., Pittsburgh. Docket G-1824 for 104.7 miles of line in Pennsylvania and New York and installation of an additional 2420 hp at two existing compressor stations in Westmoreland and Tioga counties, Pa.

NORTHERN NATURAL GAS CO., Omaha. Dockets G-1442 and G-1511 for 13.9 miles of branch and a measuring and regulating station near Humboldt, Iowa and 1.5 miles of branch and a similar station near La Platte, Neb.

NORTHWEST NATURAL GAS CO., for 700 miles in Washington, Idaho, Oregon.

PACIFIC GAS & ELECTRIC CO., San Francisco. Docket G-1651 for 141 miles 34-in. loop and 22,780 hp at authorized stations.

PACIFIC NORTHWEST PIPELINE CORP., 2175 miles of 26-in. from southern Texas to Seattle, Wash., Vancouver, B. C., via Oklahoma, Kansas, Colorado, Wyoming, Idaho, Oregon, Washington.

PIEDMONT GAS CO. INC., Hickory, N. C. Docket G-1617 for 28 miles 6-in. line.

POTOMAC GAS CO., Washington, D. C. Docket G-1768 for 14,000 ft of natural gas pipeline in Arlington county, Va.

ROCKLAND LIGHT & POWER CO., Nyack, N. Y. Docket G-1728 for 22 miles transmission line between Orangetown and Tomkins Cove, N. Y.

SHENANDOAH GAS CO., Lynchburg, Va., for 59 miles from near Cedarville, Va., to cities in Virginia and West Virginia.

SOUTHERN CALIFORNIA GAS CO. and **SOUTHERN COUNTIES GAS CO.,** Los Angeles. Docket G-1718 for 45 miles 30-in. line between Whitewater and Desert Center, Calif., 6 miles 30-in. from Blythe, Calif. station to Calif.-Ariz. border, and two 1760-hp compressors at Blythe.

SOUTHERN NATURAL GAS CO., Birmingham, 127 miles of various size pipeline and two compressor stations totaling 11,050 hp in Alabama, Georgia, Mississippi and Louisiana.

TENNESSEE GAS TRANSMISSION CO., Houston, 521 miles loop line along present system; including 420 miles 30-in. in Texas, Louisiana, Arkansas, Mississippi, Tennessee & Kentucky, and 101 miles 26-in. in Kentucky and Ohio.

TEXAS GAS TRANSMISSION CORP., Owensboro. Docket G-1847 for 407 miles 26-in. loop line on sections of existing line between Bastrop, La. and Hardinsburg, Ky. together with installation of 26,860 hp.

TEXAS-OHIO GAS CO., Houston. Docket G-1810 for 1350 miles 30-in. from Hidalgo county, Texas through Arkansas, Mississippi, Tennessee and Kentucky terminating near Spencer, W. Va. including 13 compressor stations totaling 140,000 hp.

TRANS-CANADA PIPE LINES LTD., for 2200-mile line from Alberta to major cities as far east as Montreal.

UNITED GAS PIPE LINE CO., Shreveport. Docket G-1843 to build an 11.3 mile line in Terrebonne parish, La.

UTAH NATURAL GAS CO. to build a 360-mile line from the San Juan basin to Salt Lake City. A secondary line would run from Last Chance field (Wayne county, Utah) through Sevier and Sanpete counties.

UTAH PIPE LINE CO., Dallas, for a 392-mile line from Aztec, N. M. to Salt Lake City. Includes 374 miles of 22-in. and 18 miles of 16-in.

PIPELINE PEOPLE

A. C. Polk Jr.

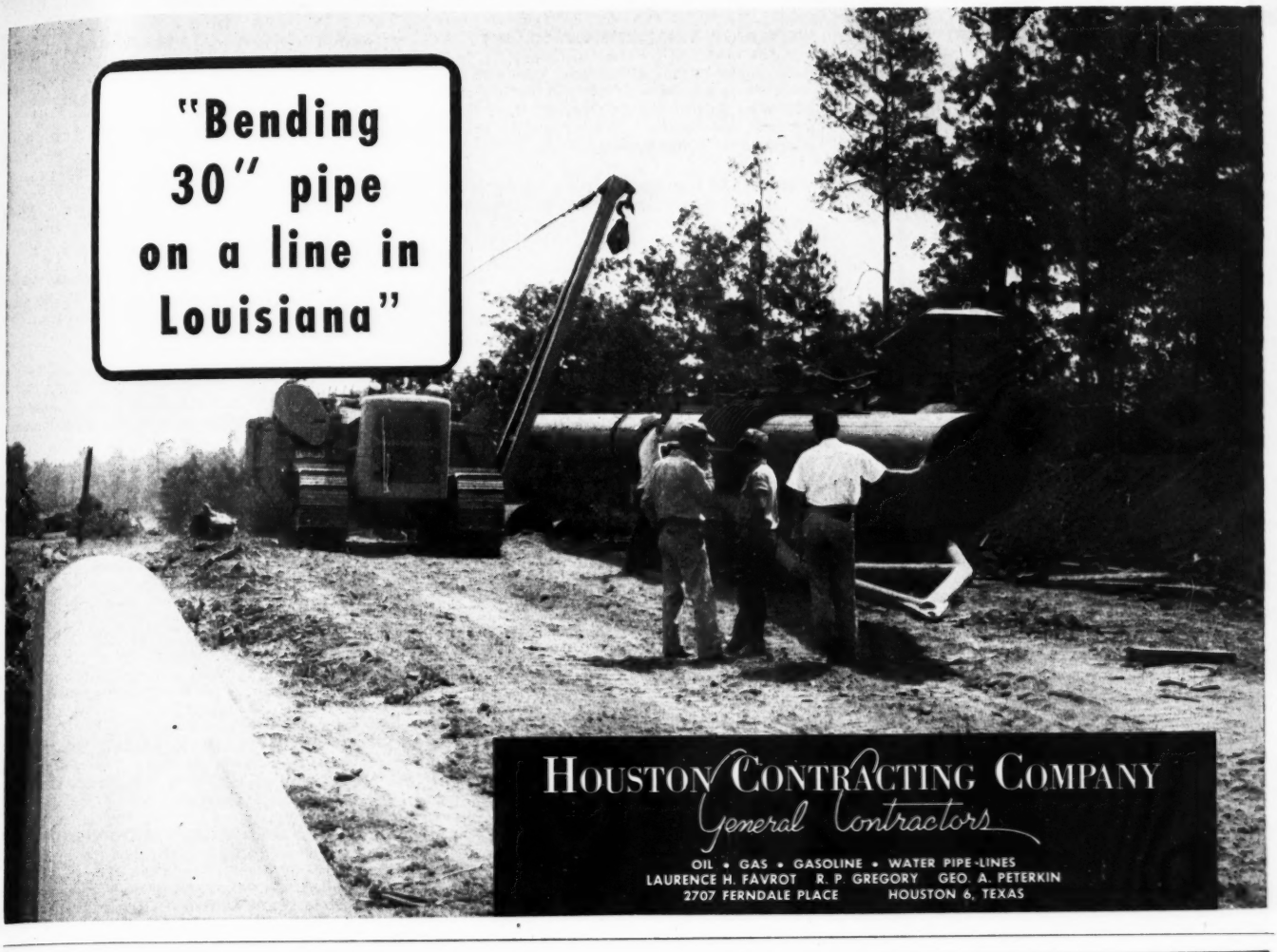
Promotion of A. C. POLK JR. from assistant manager to general manager of Dowell Inc. was announced recently by the Tulsa firm. He is also a member of the board of directors. Before his promotion to assistant manager in 1948, Mr. Polk was Houston district manager. Previously, he had been with Dowell in Levelland, Texas, Shreveport and Lafayette, La. Mr. Polk joined Dowell in 1941 after filling all oil field positions from rough neck to drilling and production superintendent.

JOHN L. SIMPSON, a director of Bechtel Corp., San Francisco, since 1945, has been elected chairman of the firm's finance committee. Mr. Simpson has resigned as executive vice president of the J. Henry Schroder Banking Corp. and the Schroder Trust Co., New York, with which he has been connected since 1925, but will continue as a director of both organizations.

Caterpillar Tractor Co., San Leandro, Calif. recently announced the election of HARRY H. FAIR, as chairman of the board of directors, succeeding the late C. L. BEST, and the election of A. H. BRAWNER to the board of directors. In addition, the appointment of H. R. LAMPE as assistant western divisional parts manager, succeeding W. R. OWENS, was announced.

HARRY MCNEELY, former chief engineer at New York State Natural Gas Corp.'s (Pittsburgh) Preston station, has been promoted to district engineer of southern Pennsylvania stations including, in addition to Preston, those at South Bend and Tonkin. WILBUR J. WHITEHILL, assistant chief engineer at Preston since last August, became chief engineer there.

Newly elected vice president of Brown & Root Inc., Houston, is C. J. ROLLO. Mr. Rollo formerly served as project manager of various construction jobs for the company.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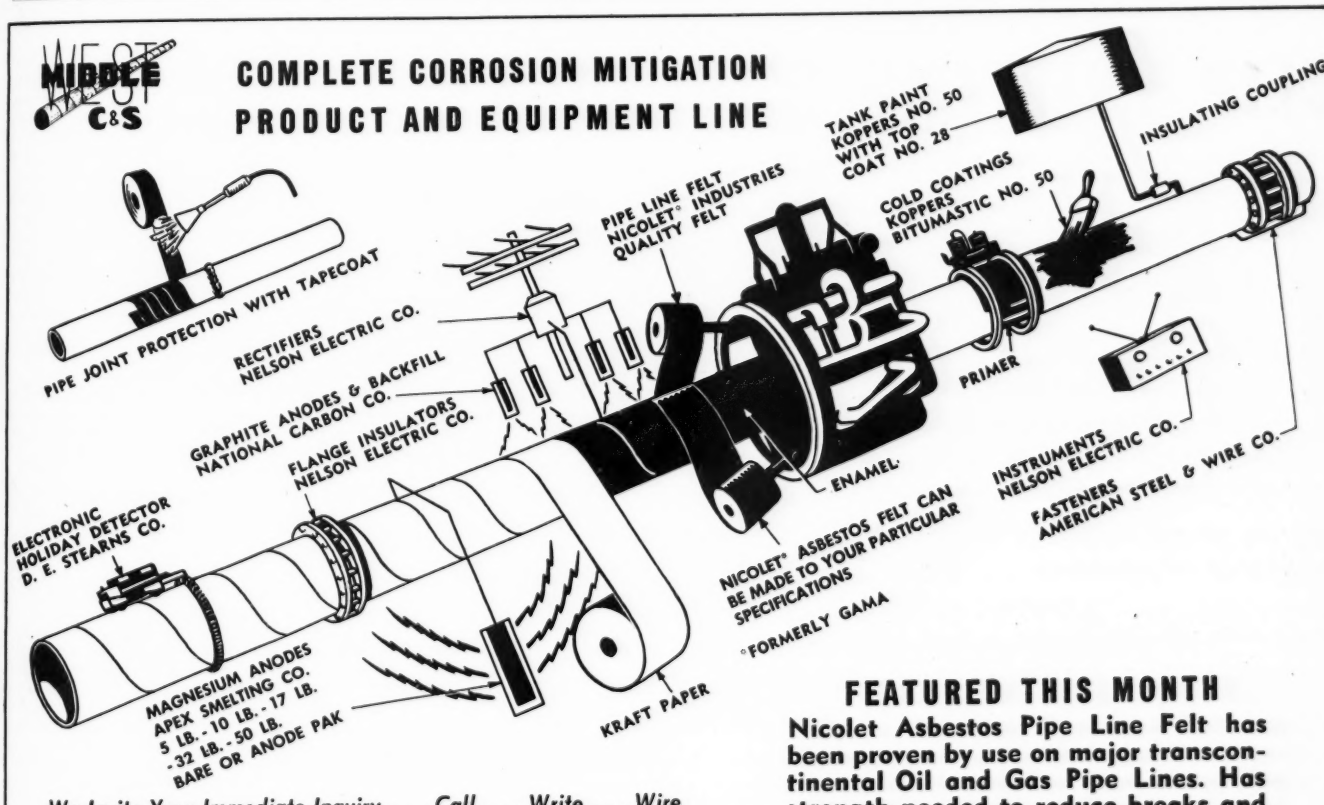
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WESTCOAST TRANSMISSION CO. INC., Wilmington, Del., 615 miles, including 277 miles from Sumas, Wash. to Portland, Ore. with short branches to a number of cities in the two states; 266 miles south from the Osoyoos, B. C. area to Spokane and Hanford, Wash.; and 72 miles of laterals and 13 measuring stations.

WEST TEXAS GAS CO., Lubbock. Docket G-1831 for 35.2 miles of pipeline and compressor stations aggregating 2010 hp in Potter and Randall counties, Texas.

Approved

SOUTHERN CALIFORNIA GAS CO., Los Angeles. Docket G-1698 for a 35-mile line in the Antelope valley, Calif.

Under Way

ALGONQUIN GAS TRANSMISSION CO., Boston, facilities to serve designated companies in Mass., R. I., Conn., and N. J. Includes 253 miles of main line and 279 miles of laterals.

CENTRAL KENTUCKY NATURAL GAS CO., Charleston, Docket G-1648. L. R. Young Construction Co. at work on 13 miles 20-in. loop northeast from North Means, Ky.

CITIES SERVICE GAS CO., Oklahoma City, at work on 56 miles of 16-, 10-, and 3-in. line in Kansas and 13,080 hp at new and old stations.

CITIES SERVICE GAS CO., Oklahoma City. Docket G-1704 for a 10-mile, 26-in. line between its Welda and Ottawa stations in Franklin county, Kan.

COLORADO - WYOMING GAS CO., Denver. Docket G-1534 has company forces at work on lateral lines and meter stations to supply gas to Public Service Co. of Colorado, its parent; add 2400 hp at its Mesa compressor station; replace 1½ miles of its Fort Warren lateral with larger pipe; and replace 6 miles of 4-in. (Golden lateral) with 8-in.

CUMBERLAND & ALLEGHENY GAS CO., Pittsburgh. Docket G-1732 to build 13 miles of line in various localities, and to retire the same amount in West Virginia and Maryland.

CUMBERLAND & ALLEGHENY GAS CO., Pittsburgh. Docket G-1773 for 35 miles 10-in. from Mountain Lake park, Md. to Monongalia county, W. Va.; 11 miles in various sections of Preston county, W. Va. and Garrett county, Md.; 725-hp station in Garrett county, and 450-hp station in Preston county.

EL PASO NATURAL GAS CO. Dockets No. G-1729 and G-1730 constructing a 1980-hp compressor station near TXL plant in Ector county, Texas.

EL PASO NATURAL GAS CO. Docket G-1629 for 10.4 miles 30-in., 36 miles field lines, 37,160 hp in main line stations, 18,910 hp in field stations, field gathering systems, and miscellaneous facilities.

IOWA-ILLINOIS GAS & ELECTRIC CO., Davenport. Docket G-1721 for a 41-mile, 10-in. line from Washington county to Cedar Rapids, Iowa.

MICHIGAN GAS STORAGE CO., Jackson, has Mahoney Contracting Co. at work on 78 miles of 16-, 22-, and 24-in. line from Laingsburg Junction to near Pontiac-Mt. Clemens, 3 laterals.

MICHIGAN GAS UTILITIES CO., Coldwater, Mich. (formerly National Utilities Co. of Michigan). Docket G-1625. Somerville Construction Co. at work on 77 miles in south central Michigan. 70% completed.

NEW YORK STATE NATURAL GAS CORP., Pittsburgh. Docket G-1601. Fish Engineering Co. at work on 12,000 hp compressor station in South Bend storage area.

NORTHEASTERN GAS TRANSMISSION CO., Springfield, Mass. 1952 construction plans include 100 miles 16-in. from Greenwich, Conn. to Springfield, Mass.; 23 miles 4-in. from Granville, Mass. to Torrington, Conn.; 26 miles 6-in. from Framingham to Fitchburg, Mass.; 45 miles of 8-, and 4-in. from Lowell, Mass. to Concord, N. H. and 15 meter stations.

OHIO FUEL GAS CO., Columbus, Docket G-1639 for 61.3 miles in Sandusky, Elyria, and Dayton, Ohio areas. H. L. Gentry at work on 26 miles of 20-in. from Wellington to Elyria, Ohio and Sheehan Pipe Line Construction Co. building 25 miles of 20-in. near Xenia, Ohio.

PACIFIC GAS & ELECTRIC CO., San Francisco. Docket G-1709 for a 44-mile, 8⅝-in. line in Monterey county, Calif.

PACIFIC GAS & ELECTRIC CO., San Francisco, has Bechtel Corp. building compressor stations at Topock, 6 compressors totaling 15,000 hp; Hinkley, 7 compressors totaling 17,500 hp; and Kettleman Hills, 8 compressors totaling 12,320.

PUBLIC SERVICE CO. of N. C. INC., Gastonia. Docket G-1407 for 25 distribution systems in North Carolina and 165 miles of high pressure transmission lines.

SOUTHWESTERN VIRGINIA GAS TRANSMISSION CO., Martinsville. Docket G-2237 for 17-mile line from Transco's line near N.C.-Va. state line to Martinsville.

TEXAS EASTERN TRANSMISSION CORP., Shreveport, to boost capacity to 1205 MMcf, 791 miles 30-in. from Kosciusko, Miss., to Connellsville, Pa.; seven compressor stations with 46,400 hp on new line, six with 52,500 hp on existing line; short lines in New York area. Williams Brothers-Davis Co. is at work on 163.6 miles of 30-in. line from Kosciusko, Miss., to the Tennessee river, and river crossing of Ohio river on Ohio-W. Va. border. Eastern Pipe Line Constructors at work on 75.5 miles 30-in. from Tennessee river to Columbia, Tenn. H. B. Zachry & Co. on 73.3 miles 30-in. from Columbia, Tenn. to Cumberland river; Oman Construction Co. on 79.5 miles 30-in. from the Cumberland to Columbia, Ky.; N. A. Saigh on 82 miles 30-in. from Columbia, Ky. to Kentucky river; Mahoney Contracting Co. on 100 miles 30-in. from Kentucky to Ohio rivers; Anderson

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